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Cryptococcosis

Review of the Literature and Report of a Case With Initial Pulmonary Findings

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CRYPTOCOCCOSIS or torulosis (*1*) is a chronic or subacute infection that may involve any part of the body, but which has a special predilection for the brain and meninges, and is considered to have a high mortality rate. Although this disease is called "blastomycosis" in the European literature, it should not be confused with American blastomycosis caused by *Blastomyces dermatitidis*. In early cases with pulmonary involvement alone, the patients are usually asymptomatic, but may complain of a slight, usually nonproductive cough. Clinical symptoms and physical signs become evident when meningitis, which is the invariable cause of death, supervenes. Headache, stiff neck, vertigo, nausea, vomiting, and mental symptoms usually occur in that order. The headache is intermittent at first but gradually becomes more severe and constant. Early physical signs are those of meningeal involvement and consist of nuchal rigidity and positive Brudzinski and Kernig signs. Later, when increased intracranial pressure develops, papilledema, ophthal-

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moplegia, cranial nerve involvement, and other focal neurologic manifestations occur. Systemic reaction is slight. Fever is seldom above 101° F., and the leukocyte count and sedimentation rate are within normal limits. Terminally coma supervenes, and the usual cause of death is respiratory failure. The diagnosis depends on the isolation of the yeast from the sputum or spinal fluid, with proof of pathogenicity by animal inoculation. The diagnosis should be considered in any case of chronic meningitis, and in any patient with roentgenographic evidence of pulmonary infiltration without apparent cause.

In 1861, Zenker reported a case of cryptococcosis of the central nervous system which was the first reported case of cryptococcal infection in man (*2*). In 1902, Frothingham (*3*) described a yeastlike fungus infection producing a mass in the lung of a horse. In 1905 von Hansemann (*4*) in Europe reported a case of blastomycosis of the central nervous system, which probably was cryptococcosis. In 1912 Rusk and Farnell (*5*) reported 2 cases of "systemic oidiomycosis" in the United States that undoubtedly were cryptococcosis. In 1916, Stoddard and Cutler (*6*) established cryptococcosis as a definite mycotic infection, that fulfilled Koch's postulates, and named the incriminating organism *Torula histolytica*, now designated *Cryptococcus neoformans*. In 1937 Levin (*7*) carefully reviewed the literature up to that time which, with 2 cases he reported, amounted to 60 cases. In 1941 Binford (*8*) added 14 cases from the literature and his own experience. Voyles and Beck (*9*), reviewing the literature and cases of their own, up to 1946, accounted for 108 cases. Up to 1949, 6 known cases had been reported in Great Britain. In 1946 Cox and Tolhurst collected data on 13 cases that had occurred in Australia in the preceding 10 years.

We have reviewed the literature since 1946 and have attempted to bring up to date the number of proved reported cases of cryptococcosis. Cases reported since Voyles and Beck's review in 1946 are as follows:

Rawson, Collins, and Grant (*10*) in 1948 reported a fatal case of central nervous system cryptococcosis, with systemic spread and necrosis of the adrenal glands with adrenal insufficiency. Mezey and Fowler (*11*) in 1946 reported one case of central nervous system cryptococcosis, in which they believed the toxic symptoms of the disease were caused by a toxin produced by budding yeast cells. Greening and Menville (*12*) reviewed 537,135 admissions to the Charity Hospital in New Orleans over a 10-year period and found only 4 proved cases. In 1947 Jesse (*13*) reported what he believed to be the first known case of cryptococcosis of the bone. Other cases have been reported by Hassin (*14*), Moody (*15*), Mider, Smith, and Bray (*16*), Neuhauser and Tucker (*17*), Reilly and Artman (*18*), Daniel, Schiller, and Vollum (*19*), and Froio and Bailey (*20*).

C. neoformans in man more frequently involves the central nervous system, less frequently the viscera, nasopharynx, skin, lymph nodes, muscles, and bones. In the 60 cases reviewed by Levin in 1937 all infections involved the central nervous system. Of these 60 cases, 30 were reported as involving only the central nervous system, with 9 reported involving also the lungs, and 8 more being generalized, 1 of which did not involve the lungs. It is difficult to determine how many cases initially involved the lungs, but at least 16 cases in this report had lung manifestations in addition to central nervous system findings. Coincident involvement of the lungs occurred in 4 of Binford's 15 cases of central nervous system cryptococcosis, and in 1 of 6 cases of Reeves, Butt, and Hammack (*21*). Greening and Menville believed thatin 83 of the 107 cases they reviewed the condition was confined to the central nervous system. In about 20 cases the lungs and the central nervous system were both involved, and in 4 cases the lungs alone were involved.

Reports of involvement of the lungs alone are rare and have been given by Sheppe (*22*) and Hardaway and Crawford (*23*), with an apparent recovery in the latter case. Sheppe reported a case, confirmed by necropsy, in which the right lung showed an organizing bronchopneumonia, with no evidence of central nervous system involvement. Hardaway and Crawford reported a case of cryptococcosis of the lung, in the absence of evidence of invasion of other organs, in which the patient remained under observation for 15 months, and when last seen was practically asymptomatic. The pulmonary lesions, however, showed little roentgenographic change during this time. They believed their case tended to confirm the opinion expressed by Stoddard and Cutler and Sheppe that cryptococcosis of the lungs offers a better prognosis than other types of infection with this organism.

The generalization of the mycotic process occurred in only 12 of 81 cases collected by Freeman (*24*), Levin, Binford, and Reeves, Butt, and Hammack, and invariably is fatal. There are a few cases in the literature in which the infectious process was localized and limited to certain parts of the body, and in which *C. neoformans* were recovered from the lesions. In 1906 Brewer and Wood (*25*) reported the first case of localized cryptococcosis, the case of a man with an abscess of the spine, apparently cured with drainage and curettement. Other localized infections with *C. neoformans* have been reported by McGehee and Michelson (*26*), Alvarez (*27*), Burger and Morton (*28*), and others.

The prognosis, except for the localized cutaneous type, is grave, especially in involvement of the central nervous system, which, until the advent of sulfonamides, was always fatal. Voyles and Beck stated

that the majority of patients die within 6 months of the onset of symptoms but if they survive this initial acute phase, they may live from 2 to 4 years.

Review of the literature fails to explain why some patients succumb rapidly and others live for several years. A yeast cell, with a thick gelatinous membrane, such as *C. neoformans*, probably is not only resistant to available chemotherapeutic agents, but produces, in most instances, little immune response in the host. Recently several cases have been reported in which there has been some response to treatment with sulfonamides, and persons with this disease lived past the usual life expectancy. These cases will now be reviewed.

Greening and Menville reported a 24-year-old Negro, with pulmonary cryptococcosis with consolidation and findings of progressive coalescence in the lower lobe of the left lung. *C. neoformans* was isolated by smear and culture from the pleural fluid. The patient was treated with sulfadiazine, penicillin, potassium iodide, gentian violet, and finally by high-voltage roentgen therapy to the chest. When last seen, 16 months after hospitalization, the roentgenogram revealed that the former pulmonary consolidation had been replaced by fibrosis. In this case there was no evidence of systemic spread, and no spinal fluid examination was mentioned.

Greening and Menville reported a 25-year-old white man with central nervous system cryptococcosis and systemic spread including pulmonary lesions. The patient was treated with tyrocidin and penicillin intrathecally, sulfonamides by mouth, and penicillin intramuscularly. He was still alive 3 years and 3 months after the onset of symptoms. Residual findings consisted of bilaterally increased deep tendon reflexes, increase in spinal fluid protein, with decrease in sugar, and occasional severe headaches. The last roentgenogram of the chest showed the lesions in the bases of both lungs to have cleared, leaving only small amounts of fibrosis.

Marshall and Teed (*29*) reported a 9-year-old white girl, who first had symptoms of cryptococcal meningitis in December 1941. Treatment consisted of mastoidectomy and repeated courses of sulfadiazine. After the onset of her symptoms she was still able to live a fairly normal life. The *C. neoformans* disappeared from the spinal fluid after less than 1 month's treatment. Personal communication with Dr. Marshall, at the time of this review, indicated that his patient was in perfect health, and that she returned to school the year following the onset of her illness and was an excellent student.

Reilly and Artman reported a 14-year-old white girl, who had her first symptoms in August 1937, and whose diagnosis of torular meningitis was confirmed in April 1938. She was treated repeatedly with

sulfonamides and was still under observation in May 1946. When she was last seen, abnormalities consisted of advanced optic atrophy, with changes in visual fields of the right eye, and lack of central vision in the left eye. An electroencephalogram showed a persistent abnormal pattern over the frontal and temporal lobes of the brain on both sides. This was felt to be consistent with cortical irritation caused by pressure. Lumbar puncture showed increased pressure, cell count, and protein, but no *C. neoformans* were found in the spinal fluid or urine.

Reeves, Butt, and Hammack reported a 15-year-old white girl whose illness first began in August 1937. The laboratory subsequently proved that she had central nervous system cryptococcosis with a pulmonary lesion, and a chronic sinus draining through the right chest wall. She was repeatedly treated with sulfonamides and iodides to the limit of tolerance. She was still alive 7 years and 8 months after the onset of her symptoms. Although her spinal fluid has been reported free of *C. neoformans* she is incapacitated by visual difficulty, weakness in her legs, and a chronic draining sinus in the right side of her chest.

Voyles and Beck reported a 44-year-old man with central nervous system cryptococcosis and systemic spread, whose symptoms probably began in February 1938. Initial improvement occurred after the use of sulfadiazine but subsequent courses of the drug failed to benefit the patient. There was a lack of response to penicillin given intrathecally and intramuscularly. This illness persisted for 7 years. On the last examination of the spinal fluid in May 1945, *C. neoformans* were still present and the patient still had a staggering gait, temporal and occipital headaches, general weakness, and coarse tremors of the hands.

CASE REPORT

A 30-year-old white man was admitted to the hospital on 9 September 1948 because of roentgenographic evidence of a pulmonary lesion. The only complaint was pain of 1 day's duration in the right lower portion of the chest which occured 1 month before admission. This pain did not return and there was no history of cough, expectoration, weight loss, anorexia, fatigue, sweating, or fever.

On physical examination the chest was resonant throughout. Auscultation revealed a few high-pitched, sibilant râles over the right middle posterior portion of the chest at the end of the respiratory phase.

Sedimentation rates were 24 and 19 mm./hr. (Wintrobe). Spinal fluid examination on 23 September was: initial pressure, 110 mm.; Queckenstedt test, cell count, globulin, and protein were all within normal limits; 33 mg. sugar per 100 cc. Sputum examination on 23 September was negative for acid-fast bacilli, and india-ink preparations revealed numerous yeast cells with a clear halo, presumably *C. neoformans* (fig. 1). Sputum cultures from the same specimen

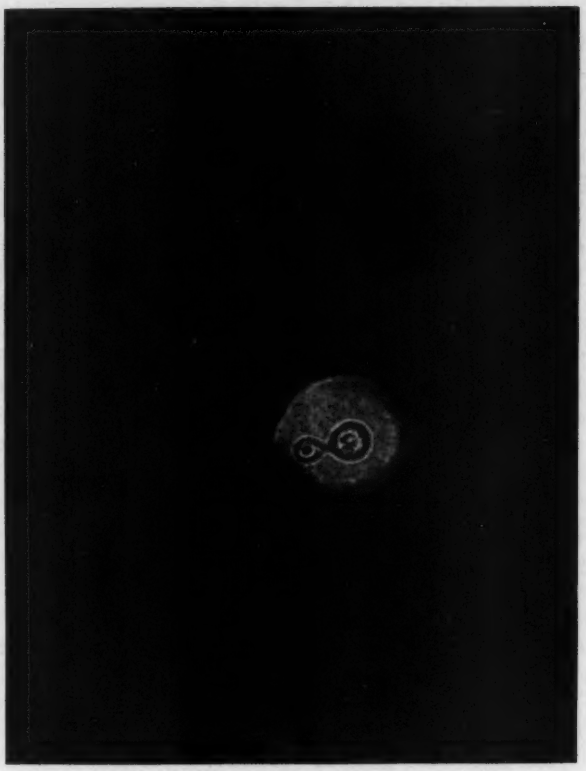

Figure 1.—India-ink preparation of direct smear from sputum showing characteristic morphologic appearance of Cryptococcus neoformans *with large capsule and budding of the organism.*

revealed budding cells with halolike capsules, morphologically characteristic of *C. neoformans.* Intraperitoneal injection of washings from these cultures into white mice caused the death of all injected animals within 8 days, and recovery of *C. neoformans* from them at autopsy. A roentgenogram of the chest on 10 September revealed a circular area of homogenous density, about 5 cm. in diameter, in the right middle-lung field (fig. 2). A lateral film of the chest placed the lesion in the right middle lobe (fig. 3). Subsequent roentgenograms showed no significant change in the appearance of the lesion. Skin tests for tuberculosis and histoplasmosis were negative but the skin test for *Coccidioides* was 3 plus. On 14 October a specimen of blood was sent to Dr. C. E. Smith for complement fixation and precipitin test for coccidioidal infection, and both were reported negative. Dr. Smith reported, "We have had similar evidence that there is no cross reaction between cryptococcus and coccidioidal serologic tests."

The patient remained completely asymptomatic from the date of admission until 25 November when he complained of a slight dull headache on arising in the morning. On 24 September he was given an initial dose of 4 gm. of sulfa-

diazine and subsequently received 1 gm. every 4 hours, night and day, until 7 December, when he refused all medication. During the period of sulfadiazine therapy, the blood level averaged about 10.5 mg. per 100 cc. On 24 September, 10 drops of a saturated solution of potassium iodide were given three times daily, and the dose was increased 1 drop daily to a total dosage of 75 drops three times daily. During this period the patient showed no symptoms or signs of toxicity to either drug. On 27 November he was given 0.4 gm. of streptomycin four times daily, in addition to the sulfadiazine and potassium iodide. This medication was continued until 7 December. Spinal puncture, on 30 November showed initial pressure of 200 mm. The fluid was clear, and the Queckenstedt test, globulin, protein, and sugar were within normal limits. The cell count was 8, with 4 polymorphonuclear cells and 4 lymphocytes. An india-ink smear revealed yeastlike organisms, morphologically characteristic of *C. neoformans*. A spinal puncture on 14 December showed initial pressure of 340 mm. with a rise to 420 on straining. The fluid was crystal clear, and again revealed, on india-ink preparations, organisms morphologically characteristic of *C. neoformans*.

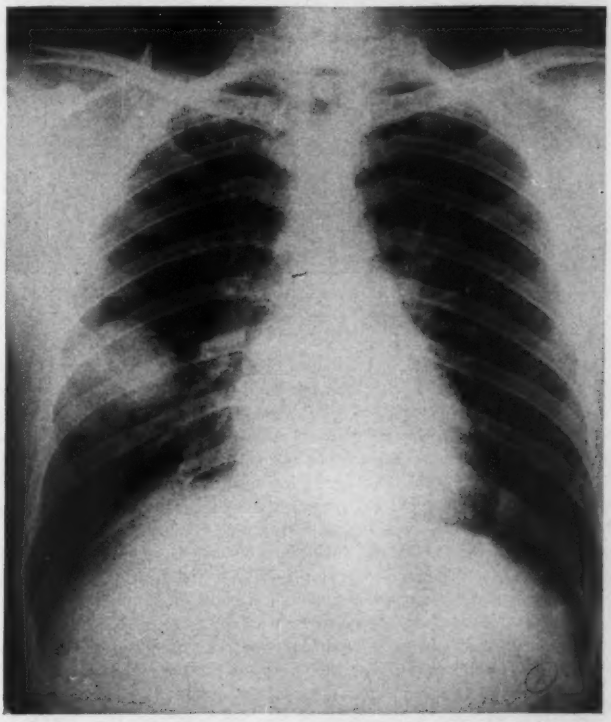

Figure 2.—Roentgenogram showing circumscribed dense infiltration in the peripheral portion of the right middle-lung field with little surrounding reaction.

Figure 3.—Lateral view of the chest showing the circumscribed density to be in the anterior portion of the right lung field.

From the day of the onset of headache (25 November) the patient continued to complain of a daily headache that gradually increased in intensity until by 3 December it became continuous. By 7 December it was severe enough to prevent the patient from eating. He refused all medication, after that time, because he believed the medicines were causing his headache. On 15 December he developed stiffness of the neck. No localizing neurologic signs were present. On 16 December and daily thereafter narcotics were given to relieve the headache. On 18 December, sensitivity studies on cultures of the organisms recovered from the spinal fluid showed that they were not sensitive to penicillin, streptomycin, aureomycin, or chloromycetin but were sensitive to polymyxin. On 19 December the patient was given 20 mg. of polymyxin intrathecally and doses of 100 mg. intramuscularly every 6 hours were started. The initial spinal fluid pressure, at the time of the intrathecal injection, was 320 mm., and the terminal pressure was 180 mm. A spinal puncture at 1300 hours on 21 December showed an initial pressure of 430 mm., and the fluid was slightly turbid. At this time, 10 mg. of polymyxin were injected intrathecally. On that date, it was noted that the patient had developed nystagmus and a convergent squint of the left eye. At 1700 hours he became comatose. Eight hours later a spinal puncture revealed a pressure in excess of 600 mm., shortly after which the patient died.

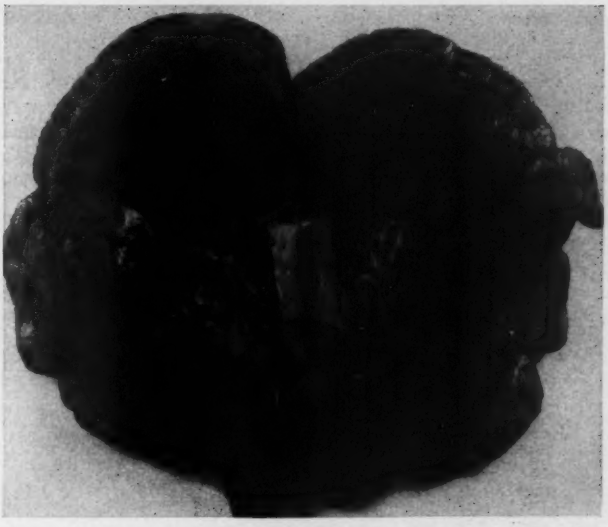

Figure 4.—Gross specimen of the lungs showing the circumscribed lesion in the middle lobe of the right lung. There is no involvement beyond the interlobar fissure.

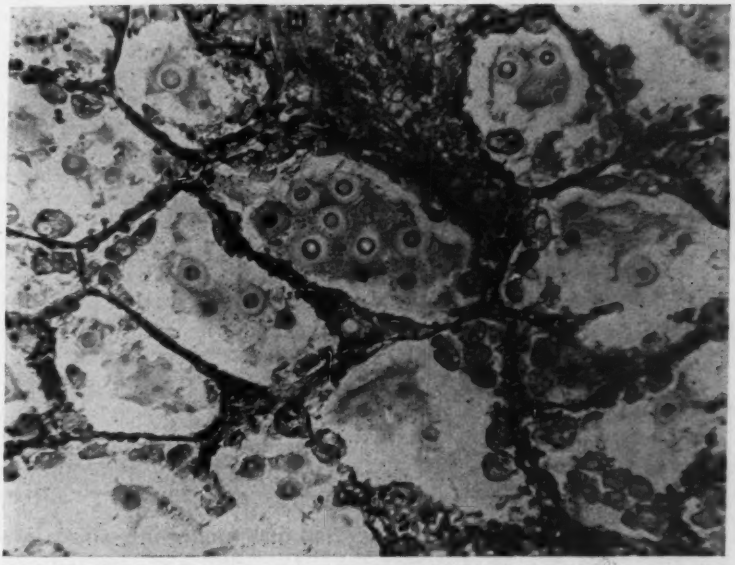

Figure 5.—High-power view of the alveoli of the lung in the involved area, showing intra-alveolar yeast-like organisms with characteristic clear capsule. The peculiar foamy cells can also be seen grouped along the alveolar septa.

The abnormalities found at autopsy were confined essentially to the lungs and brain. The middle lobe of the right lung showed a peripheral firm gray nodule (fig. 4), measuring 4 by 5 cm. Sections taken from this nodule revealed a peripheral zone, in which the alveoli contained numerous round to slightly oval, thick-walled organisms, with broad capsule (fig. 5). The meninges, from the cerebral cortex to the cauda equina, were infiltrated by moderate numbers of yeastlike organisms. A smear of fresh brain, by the india-ink method, revealed numerous organisms, morphologically resembling *C. neoformans*. Cultures of brain tissue and cerebrospinal fluid also revealed these organisms.

DISCUSSION

This case is reported not only because of the rarity of the disease and the complete pathologic report, but because it reopens the question of therapy. For years potassium iodide, in doses up to tolerance, has been used in the treatment of this disease for lack of a more effective drug. No cures effected by the use of this medication have been reported. Recently the use of sulfonamides has been advocated, and several cases have been described in which good results have been obtained, particularly as far as the prolongation of the life of the patient is concerned.

Smith (*30*) states that the prognosis is grave in all forms of cryptococcosis, but recommends that sulfadiazine be maintained in the blood at a level of 6 to 12 mg. per 100 cc. for a period of months. He further states that iodides have been of little value alone, but should be used to supplement the sulfadiazine. Voyles and Beck conducted experimental studies on animals infected with *C. neoformans* and came to the conclusion that potassium iodide and sulfadiazine, and a combination of the two drugs, showed no evidence of a beneficial therapeutic effect. In this experiment rats, rabbits, guinea pigs, and dogs were used.

Jones and Klinck (*31*) studied the therapeutic effect of sulfadiazine on experimental infections in mice and the effect of sulfadiazine and penicillin on organisms in vitro. They concluded that sodium sulfadiazine showed no demonstrable effect on *Cryptococcus*, that penicillin did not appear to inhibit the growth of the organisms in vitro, and that there was no known treatment of proved value.

Reilly and Artman experimented with white rats and concluded that sulfadiazine and streptomycin would prolong life, but that penicillin afforded slight benefit, and there was no advantage in combining penicillin and sulfadiazine. Vaccination employed in this study did not appreciably lengthen the life of the animals.

Solotorovsky and Bugie (*32*) reported that fungus infections have not responded well to chemotherapy. Penicillin and streptomycin have not been effective against fungi in vitro. This work confirmed that of Robinson, Smith, and Graessle (*33*), and Foster and Woodruff

(*34*). Bacitracin, polymyxin, and chloromycetin have not been shown to possess therapeutic activity against fungi that are pathogenic to man. Although streptothricin has been shown to inhibit the progress of cryptococcal infections in the mouse, according to Molitor (*35*) and Mushett and Martland (*36*) the use of this drug in human beings has not been effected because of its high toxicity in experimental animals. It was thought that streptothricin might be useful as a positive control for the evaluation of antifungal agents in vivo, but not for treatment in human infections. Other authors, commenting on penicillin, have reported it as affecting some strains of *Cryptococcus* but that it is of doubtful value in the treatment of patients.

Taber (*37*) stated: "the early surgical removal of a circumscribed area of torulosis seems as logical as the early removal of carcinoma." Surgery was not recommended in cryptococcosis of the central nervous system, or in generalized systemic spread. Dormer et al. (*38*) reported the case of a child with cryptococcosis of the right lung. The involved lobe was surgically removed, but central nervous system spread developed postoperatively. Froio and Bailey reported a case of pulmonary cryptococcosis in a 19-year-old man. The lower lobe of the right lung was surgically removed and 5 years and 7 months after the operation there was no evidence of meningeal spread or involvement of the left lung.

In our patient, lobectomy was seriously considered, because, on admission to the hospital, the roentgenogram of the chest and the finding of *C. neoformans* in the sputum were the only indications of cryptococcal infection; there were no cerebral symptoms at this time and the spinal fluid examination was negative. Sensitivity testing showed *C. neoformans* to be sensitive to polymyxin in vitro, but on actual treatment with this drug the infection did not respond. Other agents previously reported on, such as penicillin, streptomycin, sulfadiazine, and potassium iodide, to tolerance, were all used without success.

SUMMARY

A review of the literature revealed 127 proved cases of cryptococcosis to which one has been added. Although various therapeutic agents have been used in the past, no treatment has consistently proved beneficial in this disease. Patients showing pulmonary involvement of localized nature, in the absence of systemic spread, should be given the benefit of surgical removal of the involved lobe of the lung.

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Tuberculin Testing of Midshipmen and Recruits of the Navy and Marine Corps[1]

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WHILE our information concerning the exact mechanism of the tuberculin reaction must be regarded as incomplete, it is now generally agreed that natural hypersensitivity to tuberculin is a result of tuberculous infection. In the clinical application of this fact it is very important to distinguish between tuberculous infection and tuberculous disease. From tuberculin surveys of our population and from autopsy material there is indication that the vast majority of tuberculous infections are promptly arrested and never produce tuberculous disease. Tuberculous infection, however, does leave its mark. The tissues of the host become sensitized to the products of *Mycobacterium tuberculosis* and this sensitization can be detected by the tuberculin skin test. The test, however, has its limitations. A positive result does not indicate the age of the infection or whether the infection is active or whether the infection has progressed to disease. It merely indicates that the person at some time in the past has been infected by *Myco. tuberculosis.*

Since January 1942 fluorograms of the chest have been a part of the routine examination to determine physical fitness of inductees and applicants for the Navy and Marine Corps. In the spring of 1948 the tuberculin test was made a part of this routine. The advantages to be gained from the mass tuberculin survey of recruits are considered to be as follows:

(*a*) The tuberculin test aids the roentgenologist and internist in deciding the significance of calcifications and infiltrates observed in the initial fluorograms.

[1] Read at the forty-sixth annual meeting of the National Tuberculosis Association in Washington, D. C., and scheduled for publication in "Transactions of the National Tuberculosis Association."

[2] Preventive Medicine Division, Bureau of Medicine and Surgery, Department of the Navy.

(*b*) The tuberculin test can be repeated when indicated, particularly in those persons exposed to tuberculosis, and close observation can then be made of those whose tests become positive.

(*c*) A repeat tuberculin test found to be positive and associated with a pulmonary infiltrate will serve not only as an aid in diagnosis, but also as an aid in determining the age and hence the significance of the lesion.

(*d*) The proportion of persons who have had a tuberculous infection prior to entering the service can be determined.

(*e*) A recorded negative tuberculin test on enlistment will assist in establishing or disproving service connection to tuberculous disease discovered later. If it is found that a substantial number of the men who have clinical tuberculosis incurred their initial infection while on active duty, it will indicate the need for better control measures within the service. The question of Bacillus Calmette-Guérin (BCG) vaccination can then be discussed on firmer ground.

This report deals with the results of tuberculin testing of recruits at one Marine Corps and two naval training centers during the last 9 months of 1948. With few exceptions, all recruits were tested within 4 days after reporting for active duty from civilian life (the freshman class at the U. S. Naval Academy was also included in the testing).

The tuberculin used for testing was the purified protein derivative, prepared in tablet form. The tablets were of 2 sizes, one containing sufficient material for 50 tests and the other sufficient material for 250 tests. Measured amounts of sterile distilled water were provided in ampules, so that when one tablet was dissolved in an ampule, the resulting solution contained 0.0001 mg. of tuberculin per 0.1 cc. The test was performed by injecting 0.1 cc. of the tuberculin solution intradermally into the volar surface of the forearm. The test was interpreted 48 to 72 hours after injection of the antigen. The result was recorded as negative if there was no edema at the sight of injection even if redness was present. A doubtful reaction was one of slight redness and a trace of edema measuring 5 mm. or less in diameter. A positive test was one in which redness and definite edema were present and measured more than 5 mm. in diameter. The degree of reactivity, as determined by the diameter of induration, was recorded as follows:

\+ more than 0.5 cm., but not exceeding 1 cm.
\+ + more than 1 cm., but not exceeding 2 cm.
\+ + + more than 2 cm.
\+ + + + redness and edema plus an area of necrosis.

The results of tuberculin testing are shown in table 1. Of the 79,393 tuberculin tests performed, 7,675 or 9.7 percent were positive. Although the difference in the percentage of reactors between any 2 of

Figure 1.

the 4 activities is small, there is a statistically significant difference between the percentage of positive reactors reported at the Great Lakes Naval Training Center and that reported at the San Diego Naval Training Center. Figure 1 shows the geographic areas by place of enlistment for the recruits received at the training centers, Great Lakes, Ill., and San Diego, Calif. The slightly higher incidence of reactors found in recruits at San Diego may be due to the fact that many come from the Southern States where the incidence of tuberculous infection is somewhat greater. The degree of the reactions is shown in table 2.

TABLE 1.—*Results of tuberculin tests*[1] *in recruits and midshipmen, Navy and Marine Corps, 1948*

Station	Number tested	Reactions			
		Negative	Doubtful	Positive	Percent positive
Total	79,393	70,872	844	7,677	9.7
Naval Training Center, Great Lakes, Ill.	45,625	41,126	388	4,111	9.0
Naval Training Center, San Diego, Calif.	26,481	23,311	416	2,754	10.4
Marine Corps Recruit Depot, San Diego, Calif.	6,469	5,740	32	697	10.8
U. S. Naval Academy (Class 1951), Annapolis, Md.	818	695	8	115	14.1

[1] 0.0001 mg. PPD intradermally.

TABLE 2.—*Reactions to 0.0001 mg. PPD tuberculin*

Reaction	Number	Percent	Reaction	Number	Percent
Total	79,393	100.0	+	3,199	4.0
			++	2,470	3.1
Negative	70,872	89.3	+++	1,541	1.9
Doubtful	844	1.1	++++	467	.6

Table 3 shows the age distribution of the Navy and Marine Corps recruits enlisted during the calendar year 1948 and the midshipmen of the class tested. It will be noted that 72 percent of the Navy recruits and 88 percent of the Marine Corps recruits fall into the age groups 17, 18, and 19. The majority of the Navy recruits were 18 and 19 years of age. A correlation was made of the percentage of reactors in the various age groups for 10,000 Navy recruits. No significant difference was found in the percentage of positive reactors in any of the age groups reported.

TABLE 3.—*Percentage age distribution of Navy and Marine recruits, 1948, and midshipmen, class of 1951* [1]

Age (years)	Navy recruits	Marine recruits [2]	Midshipmen	Age (years)	Navy recruits	Marine recruits [2]	Midshipmen
Total	100.0	100.0	100.0	21	4.2	2.0	8.2
				22	4.1	1.2	3.3
17	13.8	28.1	0.0	23	3.2	.6	1.2
18	33.7	37.2	14.0	24	1.8	.4	.1
19	25.0	22.5	35.3	25 or over	3.9	.7	.1
20	9.9	7.2	37.7				

[1] From "Statistics of Military Personnel, Navy and Marine Corps," 1948.
[2] Marine recruits enlisted July–December 1948.

It should be pointed out that Navy and Marine Corps recruits are not representative of the general population because of factors other than the restricted age groups. For example, men with obvious physical defects, including tuberculosis, either do not apply for enlistment or they are disqualified by physical examination at the recruiting station and do not reach the training center. The percentage of Negro recruits is less than 3 percent and somewhat lower than that found in the general population of the United States. Men with delinquent or criminal records are barred from enlistment. Since enlistments during 1948 were voluntary, the young men who were inspired to obtain a college education are not represented.

Do the results of tuberculin testing as presented indicate that at least 90 percent of the young men enlisting in the Navy and Marine Corps have not been infected with *Myco. tuberculosis?* This question certainly cannot be answered with an unqualified "yes," although there is fairly good support for an affirmative answer. In evaluating the tu-

berculin test there are many factors that must be considered. First are the factors that bring about a false negative test. It is known that the degree of hypersensitivity or allergy wanes with the years and that after an innocuous first infection a person may show a degree of allergy so slight that it will not be detected by the ordinary doses of antigen used in testing. The age of the recruits here reported reduces the chance for this possibility. There are other conditions which depress tuberculin allergy but fortunately these, such as fever, the exanthemas, and overwhelming tuberculous infection, are infrequent in occurrence and obvious when present.

There is good evidence to substantiate the statement that false positive reactions occur when the dosage of tuberculin is sufficiently great. Furcolow et al. (*1*), in titration studies of tuberculin, found that a dose of 0.0001 mg. PPD (the same as used in the study here reported) was sufficient to provoke a reaction of 5 or more millimeters of induration almost uniformly in those persons tested having known tuberculosis, and in a high proportion of those giving a history of contact with tuberculosis. This dose, on the other hand produced relatively few reactions among children considered free of the disease and without known exposure. However, when the dose of tuberculin was successively increased, almost all the persons tested eventually reacted to the antigen, including infants and young children without evidence of tuberculous infection or history of contact. It is improbable that such a high proportion of children were actually infected with tuberculosis. The explanation advanced by the authors is that, with the use of higher doses of the antigen, nonspecific reactions appear with increasing frequency. Palmer and Petersen (*2*) state that infections with other acid-fast bacilli, nonpathogenic for man, may result in a state of hypersensitivity which is detectable by tuberculin when high doses are used in testing.

The "first" and "second" strengths of PPD tuberculin are commonly employed in this country in performing the intradermal (Mantoux) test. The "second" strength (0.005 mg. per dose) is 250 times as strong as the "first" strength (0.00002 mg. per dose) and 50 times as strong as the "intermediate" strength (0.0001 mg. per dose) used in the mass survey of Navy and Marine recruits. It was decided to retest a sample of the nonreactors and a sample of the doubtful reactors using the "second" strength tuberculin.[3] The samples were picked at random and without knowledge of the roentgenographic findings. As shown in table 4, 63 percent of a group of 450 nonreactors to the 0.0001 mg. dose gave a positive reaction when retested with the 0.005 mg. dose. A group of 50 doubtful reactors to the

[3] PPD–S supplied by Field Studies Branch, Division of Tuberculosis, U. S. P. H. S.

0.0001 mg. dose was retested with the 0.005 mg. dose and all showed a positive reaction with more than 1 cm. of induration (table 5). No reaction in the groups retested was severe enough to produce necrosis of the skin. Photoroentgen survey of the entire group of recruits and midshipmen here reported disclosed pulmonary infiltrates in approximately 1 per 1,000 men examined. It appears most unlikely that 66 percent of the group of 500 recruits retested had experienced tuberculous infection.

TABLE 4.—*Reactions to 0.005 mg. PPD in 450 recruits negative to 0.0001 mg. PPD*

Reaction	Number	Percent	Reaction	Number	Percent
Total	450	100.0	+	139	30.9
			++	96	21.3
Negative	152	33.8	+++	48	10.7
Doubtful	15	3.3	++++	0	

TABLE 5.—*Reactions to 0.005 mg. PPD in 50 recruits with doubtful reactions to 0.0001 mg. PPD*

Reaction	Number	Percent	Reaction	Number	Percent
Total	50	100.0	+	0	
			++	11	22.0
Negative	0		+++	39	78.0
Doubtful	0		++++	0	

Edwards et al. (*3*) studying student nurses found that the frequency of pulmonary infiltrates was constantly very low among persons showing less than 0.5 cm. of definite induration to the 0.0001 mg. dose of tuberculin, regardless of the degree of hypersensitivity shown to the 0.005 mg. dose. Nurses, however, who showed 0.5 cm. or more of definite induration to the 0.0001 mg. dose had a greater frequency of infiltration. These studies suggest that in young adults, a dosage of PPD tuberculin in the neighborhood of 0.0001 mg. will produce a positive reaction in the greatest proportion of individuals who have experienced an infection with *Myco. tuberculosis* and a negative reaction in the greatest proportion of those who have not experienced such an infection. A plea is made to those who report the results of tuberculin skin tests, either in clinical records or in publications, to state the *type* and *dosage* of the antigen used.

SUMMARY

Midshipmen and Navy and Marine Corps recruits showed that 9.7 percent of 79,393 men tested had a positive reaction to a dose of 0.0001 mg. PPD tuberculin. The incidence of positive reactors in Navy recruits was slightly higher (10.4 percent) in men who enlisted

in the Southern and Western States as compared to the incidence (9.0 percent) for men who enlisted in the North Central and Northeastern States.

Approximately 84 percent of the recruits and midshipmen reporting for training during 1948 were of the 17- through 20-year age group. Caution should be used in applying these results to even the same restricted age groups of the general population because of certain factors which influence the selection of midshipmen and recruits for the service.

The second strength of PPD tuberculin (0.005 mg. per dose) produced a high incidence of presumably nonspecific reactions in a group of 500 Navy recruits retested.

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Motion Sickness

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MOTION sickness is that disability produced by acceleration and deceleration or rotation in any plane. The abnormal motions produced by trains, automobiles, and aircraft are usually less in degree or continuity than those produced by ships so that seasickness is the most classical example of motion sickness. Other examples of motion sickness are elevator sickness, swing sickness, and the vertigo produced by whirling as in some forms of dancing and skating. The vehicle or mechanism producing changes in acceleration is unimportant.

The sense of equilibrium is not a single sense as, for example, hearing is the sense of the cochlea; it is the function of several organs, the most important of which are the labyrinth, the proprioceptive sense, and vision. Fish are suspended in water which uniformly distributes its pressure on their external surfaces. They depend mainly on the labyrinth to determine their relationship with the force of gravity; of course, the labyrinth is well developed in these aquatic animals.

In terrestrial animals contact with gravity is made through only a small portion of the body surface, i. e. the feet, the supporting force of air being negligible. To maintain equilibrium, it is important that the proprioceptive sense be well-developed and such is the case. Birds, while flying, develop forces which counteract gravity so that mere equilibrium is not sufficient; orientation or reference to distant as well as proximate and internal environment is necessary. This is supplied mainly by vision. Man, without instruments, cannot fly without visual contact with the earth.

Many theories on various causes of motion sickness have been advanced, but the most popular are the labyrinthine and proprioceptive theories. The former contends that continuous stimulation of the vestibular apparatus by movements causes reflex nausea similar to

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that produced by the caloric or rotation tests. Strong support for this theory is the experiment that bilateral labyrinthectomy in four susceptible dogs rendered them nonsusceptible to motion sickness. On the other hand, no positive correlation between caloric tests and susceptibility to motion sickness could be demonstrated (*1*).

Vertigo and nystagmus which is characteristic of stimulation of the semicircular canals is not a characteristic symptom of seasickness. Advocates of the vestibular theory state that the symptoms are not primarily due to stimulation of the semicircular canals but to the utricle and perhaps saccule which record vertical movements and motion of translation respectively. In this connection it is interesting to note that ascent is usually the motion least tolerated. This motion is recorded in the utricle. Pitching, rolling, and yawing, in the order named, are usually the most offensive.

Another explanation suggested for the maximal effect of vertical movements is the change in filling of the large vessels of the head and neck, thus stimulating the carotid sinus with resultant changes in the autonomic nervous system (*2*). There is no experimental evidence to substantiate this theory.

Proprioceptive sense is mediated through the afferent impulses normally arising in muscles, tendons, and joints. Normally the body maintains its equilibrium largely by unconscious reflex action initiated by these afferent impulses plus those from the labyrinth. In tabes dorsalis these somatic impulses from the lower extremities may be abolished by disease of the columns of Goll and Burdach. Vision helps compensate for this loss, but the patient falls when in the dark or when blindfolded. Deaf-mutes in whom the labyrinths are absent, have no difficulty in maintaining their equilibrium when blindfolded. These facts have been cited to indicate that the proprioceptive sense is more important in equilibration and, therefore, in the causation of seasickness. It is a well-known fact that on lying down the symptoms of seasickness are ameliorated. This probably occurs because of the elimination of the stimuli from the righting reflexes originating in the skeletal system in the erect posture.

Relief by wearing a tight binder to minimize visceral movements has been reported. In running and other gymnastics, nausea and vomiting do not occur yet the visceral movement is certainly greater than that incident to the comparatively gentle roll and pitch of a vessel at sea. Young healthy recruits are as susceptible to seasickness as older visceroptotic persons in whom greater visceral movements should theoretically cause greater stimulation. These facts tend to discredit the visceral theory; in fact, objections can be found to any theory which incriminates a single organ or system.

Visual impressions are most important in orientation and equilibrium. Many people become nauseated when objects are passed rapidly before their eyes; discrepancy between the visual sense of motion and the proprioceptive and labyrinthine sense of stability probably accounts for the vertigo. Skaters and dancers by fixing their vision on a stationary object for a moment during each revolution neutralize the disorientation produced by spinning. Another method of avoiding symptoms is to snap the head in a direction opposite to that of the spin. This neutralizes the excessive labyrinthine stimulation produced by spinning. Suturing the eyelids or fixing the animal in plaster casts reduces an animal's susceptibility to motion sickness.

Strong or offensive odors such as exhaust gas, tobacco smoke, and cooking odors may precipitate symptoms.

It thus becomes apparent that motion sickness is not the result of stimulation of a single organ. It is the result of a break in accommodation by the spinal and medullary centers from continual unusual stimuli arising in many organs. In the order of importance, the senses are probably vestibular, proprioceptive, visual, and then the others. An important factor in this breakdown is a discrepancy in the sensations from various senses. Sensations from the labyrinth, somatic, or other senses are not unpleasant per se; it is the abnormal reflexes produced by these sensations that are unpleasant. Stimuli from various organs normally cause automatic and usually unconscious adjustments of the body to changes in its relation to the force of gravity. These sensations are correlated and integrated in cerebellar, medullary, and spinal centers. When these centers are repeatedly subjected to unusual stimuli, particularly when the stimuli are inconsistent, a point is finally reached when they cause more than the proper reflexes. A spill-over to other medullary and higher centers occurs, thus producing the symptoms of motion sickness. The break in accommodation may be quite sudden. In the midst of a conversation, the victim may be suddenly overwhelmed by nausea and vomiting. Just as accommodation can be broken, it can be acquired or regained. When this occurs on board ship the passenger is said to have acquired his "sea legs." This desirable state occurs when the spinal and medullary centers compensate for the motion of the ship and impulses no longer spill over to other centers. After a prolonged voyage, this adjustment to a periodically heaving deck may become so habitual that it continues when the passenger lands and the ataxia produced ashore has been referred to as "land sickness."

The symptoms of any organic disease are largely influenced by psychic factors and this is particularly true of mal de mer. These psychic factors are so commonly found that the entire symptom-complex is sometimes erroneously called functional. The fact that ani-

mals, including trained seals, and even fish, have been reliably reported seasick should be sufficient to refute this theory. Individual susceptibility to seasickness varies greatly. Some persons claim that they are never seasick; as a rule they are phlegmatic.

The nausea which affects a student aviator on making preparation for a hop, or the ship's passenger before the ship leaves the dock, is purely functional and should not be designated air or seasickness. It is probably a conditioned reflex based on association with previous experience and fear. The ease with which nausea and vomiting can often be precipitated by suggestion in a passenger already experiencing symptoms, is another example of the psychic influence.

In addition to simple conditioned reflexes there is also the complex effect of mental attitudes including memory, association, and fear. In airsickness, especially, the unsatisfactory rationalization of fear is a great factor. Whenever sea legs are lost without a distinct change in the periodicity of the ship's movements or when airsickness occurs in an experienced pilot who is not subject to airsickness, the cause is usually psychogenic. Most persons adjust well to the usual motion encountered at sea but an adjustment to a certain type does not prevent symptoms from developing when the motion changes its periodicity or becomes much greater. This type of seasickness should not be considered psychogenic. A person who rides comfortably on a battleship or ocean liner may be completely incapacitated on a destroyer or seagoing tug. Some individuals always remain susceptible and are miserable whenever they go to sea. Naval personnel have a small percentage of such cases even among old salts. Lord Nelson of Trafalgar fame was a victim of seasickness during his entire naval career.

In an analysis of unusually susceptible persons, 66 percent were found to have neurotic tendencies as compared with 23 percent in persons less susceptible to motion (*3*). That seasickness is often used as an escape mechanism is not doubted. The lethargy and mild depression produced by incipient motion sickness may justify an avoidance of responsibility or inadequacy in performing duties. Intense interest, on the other hand, may hold symptoms in abeyance. An emergency requiring action may dissipate the symptoms of motion sickness and, in general, persons who perform necessary or purposeful activity acquire "sea legs" much sooner than those who remain idle.

The symptoms of seasickness vary. The mildest consist merely of a slight depression, aversion to tobacco, food, and odors, and a dull occipital headache. There may be increased awareness of the epigastrium and increased yawning. Increased salivation and nausea are premonitory symptoms before the characteristic vomiting which is of the projectile central type. Pallor and cold sweating are usually present. Retching may continue spasmodically and is attributed to

spasmodic contraction of the diaphragm. The slow pulse and respiration, pallor and sweating, and subjective symptoms are similar to those produced by vagus stimulation as in excessive smoking. A sympathicotonic form characterized by restlessness, excitability, and insomnia has also been described. The facial expression of great dejection accurately records the patient's sensations.

Tests made on seasick patients showed an increase in blood sugar, a decrease in phosphorus, and a normal electro-encephalogram; no correlation was observed between instability and susceptibility. Electrocardiograms, blood pressure, and blood gas studies were also normal (*1*).

TREATMENT

General hygienic measures a day or two before sailing with avoidance of last minute parties, bustle, and nervous tension are advantageous. The motion of the ship often produces insomnia in persons not seasick. In such cases a barbiturate such as nembutal is excellent. Since the multiplicity of new and unaccustomed stimuli has much to do with causing seasickness, steps to reduce his reaction to stimuli should be taken by the susceptible passenger. Lying down with the eyes closed or reclining in a deck chair facing away from the sea, will reduce both visual and skeletal reaction to stimulation. Good ventilation and absence of odors is of great help. Physical exertion tends to minimize the effect of the sea because of the purposeful motor activity. Walking and sports tend to reduce the tendency to lethargy when at sea. Reading is usually difficult and ambitious reading programs planned for a trip usually are never carried out. In the Navy, mild forms of seasickness are usually ignored and sea legs are acquired while the recruit busies himself with ship's work.

Atropine, hyoscine, and hyoscyamine have been prescribed because they inhibit the vagus or parasympathetic nerves. This seems rational because the symptoms are characteristic of overstimulation of the parasympathetic nerves. Undue hypnosis, dryness of the mouth, and other side effects are often noted with these drugs. The barbiturates, preferably one of the quick-acting ones as seconal or nembutal, are probably useful adjuncts in the early phases; besides alleviating apprehension and worry, they reduce the sensitivity of the medullary centers and so facilitate adjustment.

Until recently these methods were the best available. In November 1948, a clinical study of motion sickness was undertaken to determine the effectiveness of a new drug (dramamine) on seasickness (*4*). The effects of dramamine on personnel in each compartment of an army transport were observed and, as a result, the following conclusions were recorded: (*a*) When used prophylactically, 29 percent of those

treated by placebo were seasick as compared with 1.4 percent of those treated with dramamine. (*b*) All persons showing active symptoms of sickness were relieved by dramamine within half an hour. Side effects were minimal.

Dramamine is apparently a nontoxic, powerful, prophylactic, and therapeutic drug when used to control the symptoms of motion sickness.

We have used dramamine in the treatment of Ménière's disease with dramatic symptomatic relief of vertigo. Since May 1949 we have routinely used dramamine for the relief of postoperative vertigo following the fenestration operation. While nystagmus was usually unaffected, all other unpleasant symptoms such as vertigo, nausea, and vomiting were largely eliminated. The benadryl component of dramamine has an atropinelike action as well as anesthetic and mild hypnotic effects (*5*). Recent experiments indicate that dramamine affects the central nervous system above the level of the vestibular nuclei but not the labyrinth (*6*).

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Vagus Resection

A Study of 19 Cases

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THERE has been so much controversy about vagus resection, with or without gastric drainage, that this article is written to present in detail the pre- and post-operative findings in 19 cases of vagus neurectomy.

There are two operative approaches to the vagus nerve, transabdominal and transthoracic; the individual case will determine the approach. In 18 cases, an abdominal approach through the left rectus muscle was used.

The only outstanding disadvantage of the transabdominal operation is that all the nerve trunks may not be severed. In one patient, there were two main nerves and one accessory. In all other patients, there were from two to five accessory or connecting nerve fibers which required excision. One worker reported that 8 percent of the nerve trunks are not definable infradiaphragmatically. The disadvantages following the transthoracic approach are: (*a*) the intra-abdominal lesion cannot be explored, (*b*) persistent postoperative thoracic pain may be present, (*c*) there is no opportunity to perform a concomitant intra-abdominal procedure, and (*d*) secondary surgical procedures may be necessary (*13*).

Vagus resection for the treatment of peptic ulcer has been studied by numerous investigators for many years. It was advocated by Stierlin in 1920. The stimulus for this research was originated by Pavlov in 1890, when he demonstrated that gastric function was influenced by the vagus nerve. This was later confirmed by other workers in the twentieth century (*1*).

Dragstedt (*4*) (*5*) (*6*) (*7*) stressed the use of vagus resection in cases of peptic ulcers with complication and those resistant to medical treatment, and especially emphasized the effect of the operation on the first period of gastric secretion—that of interdigestive or continuous secretion. It seems likely that certain aspects of the second period, digestive secretion, are favorably affected (*2*). This second

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or digestive period has been divided into the cephalic, gastric, and intestinal phases. The cephalic phase occurs when secretion and motility are influenced by mental stimuli; the gastric phase, when secretion and motility are stimulated by contact of gastric mucosa with secretagogues or food; and the intestinal phase, when chyme is being propulsed and secretion enhanced by the presence of the bulk.

Vagus resection is of therapeutic value only if the operative procedure is complete, and if all the vagus fibers are severed as described by Weinstein et al. (*3*). Dragstedt (*4*) (*5*) (*6*) (*7*) was the first to report bilateral vagus resection.

Sham feeding and the use of insulin are the two methods for evaluating the completeness of vagus resection. Of these, the latter was considered the most practical in this study, since standard doses of regular insulin and accurate laboratory facilities were available. The effect of insulin hypoglycemia on the stomach has been studied thoroughly—it is thought to cause an increase in gastric motility (*8*) (*9*) (*10*) (*11*). The mechanism of action is considered to be a central vagal effect and there occurs an increase in gastric motility and secretion due to hypoglycemic stimulation of the vagus center (*3*) (*12*). Complete vagus resection abolishes these actions.

The relief of pain is not associated with evidence that pain pathways have been divided, as judged by postoperative balloon distention observations. Pain is still perceived in response to stimulation of the esophagus, duodenum, and jejunum, as shown by Moore et al. (*14*), and also when hydrochloric acid is introduced into the stomach, as shown by Dragstedt. It appears more probable that relief is due to decreased acidity or motility, or to both (*2*).

Merely because complete vagus resection is followed by immediate relief of pain, clinically, does not mean that excessive vagus stimulation is the cause of peptic ulcer. A patient may not be benefited by vagus resection, even though he is free from pain because vagal activity is not the pathogenic factor. A disorder such as aerophagism, masked gallbladder disease, or psychoneurosis may have been the basis of his syndrome. The vagus nerve is important in the interdigestive phase and in the gastric, cephalic, and intestinal phases of the digestive period.

A review of the literature on vagus resection in the treatment of peptic ulcer indicates that there are four questions to which answers should be obtained in order that physicians may evaluate this procedure. These questions are: (*a*) Are patients with peptic ulcer clinically benefited by the operation, and if so, what are the indications, contra-indications, and complications? (*b*) What demonstrable physiologic gastrointestinal changes are produced by resec-

tion of the vagus nerve? (*c*) How long do these physiologic changes persist? (*d*) How long do patients remain well from a clinical and roentgenologic standpoint (*14*)?

No treatment of peptic ulcer can be fully evaluated until it has been in use for a period of from 15 to 25 years.

CASE REPORTS

Case 1.—Three years before admission this 36-year-old man noted epigastric pain and dyspepsia. A duodenal ulcer was demonstrated by roentgenogram. An ulcer regimen was instituted with regression of symptoms on two subsequent occasions; finally intractable pain developed. At operation an ulcer was seen in the first portion of the duodenum; vagus resection was performed.

Convalescence was uncomplicated except for persistence of three to four watery stools daily, beginning 1 month following discharge from the hospital. Five months later a gastroenterostomy was performed but the diarrheal symptoms continued for 7 more months until, under psychotherapy at a foreign base hospital, the patient was readjusted. Following this, he remained asymptomatic.

A gastrointestinal series 3 weeks, 9 months, and again 16 months after operation, failed to show any ulcer. The results in this case were satisfactory, after the gastroenterostomy and psychotherapy.

Case 2.—This 40-year-old man had had a duodenal ulcer for 4 years; characteristic epigastric ulcer pain had been relieved by food. Two massive hemorrhages had previously occurred 2 years apart. Gastrointestinal series revealed a small ulcer on the lesser curvature of the pyloroduodenal junction. No gastric retention was present. After 1 month of medical treatment without improvement a vagus resection was performed. No other procedure was considered necessary since the pylorus was sufficiently patent.

The postoperative course was uncomplicated, and recovery uneventful.

Eighteen months after vagus neurectomy this patient was working daily and was asymptomatic except for occasional mild gaseous distention.

Case 3.—For 2 years before admission to the hospital, this 38-year-old man had been having mild epigastric pain. He had received no treatment. Four months after the onset of his pain, hematemesis and several tarry stools occurred, followed by severe epigastric pain which was unrelieved by food or antacids. On admission, roentgenographic studies showed a small ulcer niche on the inner aspect of the duodenum. Gastric emptying was normal. Intractable pain continued and after 3 weeks of medical care an exploratory laparotomy was performed. A nonobstructing ulcer on the anterior surface of the duodenum was seen and vagus neurectomy was performed. His convalescence was satisfactory. Roentgenogram 1 month postoperatively showed the duodenal ulcer to be healed; the patient had returned to work. Eighteen months after operation the patient had infrequent episodes of vomiting and gaseous distention.

Case 4.—In this 33-year-old man a duodenal ulcer was demonstrated roentgenologically 2½ years prior to admission. Following this he had two gastrointestinal hemorrhages, and 2 weeks before admission he had severe intractable epigastric pain accompanied once by hematemesis. He was not relieved after 3 weeks of medical treatment. Roentgenograms showed an ulcer in the first portion of the duodenum with scarring and no obstruction. A vagus resection was performed.

Convalescence was satisfactory. Roentgenogram 2 months following the operation showed no ulcer. Sixteen months later the patient was definitely improved; he was free from pain although he had postprandial eructation on rare occasions. Two years later, he had a recurrence of symptoms. Medical treatment for 6 weeks gave no relief. Another operation was performed and the ulcer was still present. Examination of the site of vagus resection revealed it to be incomplete; the left vagus nerve was intact. It was sectioned as usual and a partial gastrectomy performed. His symptoms were completely relieved, and have remained so.

Case 5.—For 4 years this 47-year-old man had had a peptic ulcer. A bland diet and antacids were prescribed but epigastric pain accompanied by vomiting occurred occasionally. A roentgenogram showed a small niche along the greater curvature of the duodenal cap. After 2 weeks of medical treatment he still had intractable pain. No retention was present. At operation a duodenal ulcer was found on the first portion of the duodenum. A vagus resection was performed.

Fifteen months after operation he began vomiting and vomited about once every 2 or 3 months but he had no pain.

Case 6.—An ulcer had been present in this 42-year-old man for 5 years. Treatment with a bland diet and antacids controlled the symptoms until 5 weeks before admission when intractable pain accompanied by vomiting occurred. One massive gastrointestinal hemorrhage had occurred 2 years previously.

Roentgenogram showed an ulcer in the greater curvature of the base of the duodenal cap. No obstruction. The condition failed to respond after 1 month of medical treatment. At operation the ulcer was identified and a vagus resection performed. The postoperative course was uncomplicated.

Fourteen months postoperatively he began to have daily vomiting and persistent moderate gaseous distention. A bland diet was continued. Nine months after operation some vertigo was present and he fainted three times during the summer months. Fainting did not occur in the 4 months following the summer episodes. During these episodes he found that eating sugar and honey prevented fainting.

His postoperative condition was not considered satisfactory. Perhaps a concomitant gastroenterostomy would have been of benefit.

Case 7.—This 35-year-old man gave a history of duodenal ulcer and of episodes of diarrhea and melena for 17 years. A posterior contraperistaltic gastroenterostomy was performed at this hospital 2 years earlier. The patient on readmission complained of intractable epigastric pain. At operation a marginal ulcer and a fistula between the gallbladder and first portion of the duodenum were found. A vagus resection was performed. One month later a cholecystectomy was performed.

The postoperative course was uneventful. He returned to work 2 months after operation; his only complaint was occasional gaseous distention.

Case 8.—Four years before admission to this hospital, a diagnosis of peptic ulcer was made in this 27-year-old man. During the following period he had one severe hemorrhage. Medical treatment gave him no relief from epigastric pain and dyspepsia. A gastric resection and anterior contraperistaltic gastrojejunostomy were performed. Following this he gained 34 pounds but 1 year later he had to return to the hospital because of severe intractable epigastric

pain which did not respond to treatment. At operation a marginal ulcer was found and a vagus neurectomy was performed.

Convalescence was uneventful. Three weeks later no ulcer was demonstrated on roentgenographic examination. Eighteen months following vagus resection he was free from pain and only had vomiting when emotionally upset.

Case 9.—Six years prior to admission this 52-year-old man had had a gastroenterostomy at a civilian hospital. He remained asymptomatic for 3 years. In the next 3 years two episodes of severe gastrointestinal hemorrhage occurred. In the past year although the epigastric pain was relieved by food and antacids, there was a weight loss of 10 pounds in 3 months. Gastrointestinal series showed an ulcer of the duodenal cap and some obstruction at the pylorus and a normally functioning posterior gastroenterostomy. After 3 weeks of medical treatment an operation was performed. A marginal ulcer was found and a vagus resection was performed.

The postoperative course was uneventful. Roentgenograms 3 weeks following operation revealed no ulcer.

Seventeen months following vagus resection, the patient complained of nausea and vomiting two to three times a week and also had a moderate amount of gas postprandially. He had no pain. He took a regular diet. Physical examination showed no abnormality and therefore it was considered that his complaints were psychosomatic in origin.

Case 10.—This 47-year-old man, during a 9-year period before admission, had had two massive hemorrhages and a gastroenterostomy that was performed 8 years earlier. He was asymptomatic until 1 month before admission; since then burning epigastric pain, lasting 15 to 20 minutes, occurred one-half hour following meals. He had lost 12 pounds of weight. One day previous to admission, a massive gastrointestinal hemorrhage occurred and continued for 3 days. Three weeks later, a roentgenogram showed a functioning posterior gastrojejunostomy with evidence of marginal irritability. There was a partial obstruction at the pylorus and an ulcer crater on the lesser curvature of the stomach. After 1 month of treatment epigastric distress was still present. An operation revealed a cicatrizing ulcer on the first portion of the duodenum. A vagus resection was performed.

His convalescence was satisfactory. Roentgenograms made 3 weeks and again 2 months following vagus resection showed no ulcer. Seventeen months after operation the patient was much improved. Constipation which was present before the operation was relieved. He had three episodes of 8 to 9 watery stools per day for 4 days—2 weeks, 1 month, and 15 months after operation. By eating 4 or 5 small meals daily he gained 10 pounds in weight.

Case 11.—Nine years previous to admission this 52-year-old man completely recovered from tuberculous epididymitis which was treated with drainage. Seven years before admission, he had a cholecystectomy, and 6½ years prior to admission he had a partial gastrectomy for duodenal ulcer.

His complaints on admission were compatible with marginal ulcer and this was demonstrated by roentgenogram. Medical treatment failed to relieve his symptoms. A transthoracic vagus resection was performed and this was followed by complete relief of symptoms for 13 months.

Two months postoperatively the patient sustained a spontaneous compression fracture of the second and third lumbar vertebrae, and 4 months later he had a spontaneous fracture of the spinous process of the right scapula. On two occasions the serum calcium was 15 mg. per 100 cc. and the serum phosphorus

9 mg. per 100 cc. The basal metabolism rate was +23, +33, and +28. Multiple myeloma, Cushing's disease, and hyperparathyroidism were ruled out. Whether the vagus resection was responsible for this condition or whether its occurrence 2 months after vagus resection was coincidental is not known.

Case 12.—Fourteen years previous to admission this 37-year-old man had a peptic ulcer which was demonstrated by roentgenogram. Eight months prior to admission a partial gastric resection was performed at another institution. He remained asymptomatic for 4 months when burning epigastric pain occurred; this finally became intractable. At operation a marginal ulcer was found and a vagus resection was performed. Convalescence was uneventful. Twelve months postoperatively the patient had no vomiting and only had occasional mild gaseous distention.

Case 13.—For 28 years prior to admission this 54-year-old man had had symptoms of peptic ulcer for which, 16 years prior to admission, a partial gastrectomy and gastroenterostomy were performed. He was admitted with a jejunocolic fistula. A resection of the jejunum, repair of the transverse colon, partial gastrectomy, and a new anterior contraperistaltic gastrojejunostomy were performed. Three months later, the patient was readmitted because of intractable pain; on gastrointestinal series extreme tenderness was found at the site of the new stoma. At operation, a jejunal marginal ulcer was found and a vagus resection was performed.

The postoperative course was uncomplicated. Three months later the patient was asymptomatic except for occasional slight gaseous distention following meals.

Case 14.—This 31-year-old man had symptoms of peptic ulcer for 3 years. Repair of a perforated peptic ulcer had been performed 2 years after the onset of his symptoms. Following this he had intractable epigastric pain. Hospitalization and appropriate treatment failed to give him relief. The pain became constant, dull, and gnawing in character. Tarry stools occurred on several occasions. A gastrointestinal series showed a duodenal ulcer.

At operation one old healed, and one active duodenal ulcer were found. A gastrojejunostomy (posterior isoperistaltic) and vagus neurectomy were performed.

A gastrointestinal series 4 weeks later showed a healed ulcer of the duodenum. The patient's condition 20 months after operation was poor because of the persistence of frequent episodes of vomiting and gaseous distention. It is believed that this patient required psychotherapy for readjustment since many of his complaints were not consistent with the physical findings.

Case 15.—This 65-year-old man had had intermittent "dragging" pain in the right upper quadrant of the abdomen associated with "gas" and eructation for 15 years before admission. During this entire period he had been on an ulcer regimen. The pain gradually increased in severity but was usually relieved by food and antacids. He had had three episodes of severe hematemesis during this period.

Roentgenologically, a gastric ulcer on the lesser curvature of the stomach was found; gastric emptying was normal. At operation, a vagus resection was performed. Three weeks postoperatively a roentgenogram showed no ulcer. Improvement was noted 3 months postoperatively and 19 months following operation he was free from pain; although vomiting occurred about once a week and mild gaseous distention was occasionally present in the afternoon. Two years postoperatively, a laparotomy for duodenal diverticulum was performed; the ulcer was found to be completely healed.

Case 16.—Five years before admission, this 39-year-old man was discharged from the Army because of peptic ulcer: his pain was relieved when he adhered to treatment. His symptoms recurred 4 years after discharge and again 5 months later. Medical management and hospitalization for 1 month gave him no relief and a vagus resection and gastroenterostomy were performed. Convalescence was satisfactory, but 2 weeks postoperatively he had delusions and a diagnosis of schizophrenia was made.

Roentgenograms made 2 months and again 14 months postoperatively showed no ulcer. Sixteen months following operation the patient reported that he had one episode of vomiting monthly and had gaseous distention at infrequent intervals. He took a regular diet (except for pickles and onions).

Case 17.—For 9 years the patient, a 33-year-old man, had been taking a bland diet because of a peptic ulcer. Two episodes of severe hiccups developed during this period, the last one occurring at the time of his admission to this hospital. Medical treatment was instituted and continued for 6 months but he had no relief. A roentgenogram showed a scarring deformity in the duodenal cap. There was no obstruction. Operation revealed an old ulcer on the anterior portion of the duodenal cap and a traction diverticulum. A posterior gastrojejunostomy and vagus resection were performed and the diverticulum was freed from its adhesions.

A gastrointestinal series 3 weeks postoperatively showed no ulcer. Sixteen months postoperatively the patient was improved although he had vomiting and mild gaseous distention at infrequent intervals.

Case 18.—This 47-year-old man had symptoms of intermittent nausea, vomiting, and diarrhea for 1 month. A duodenal ulcer was found on roentgenogram. Medical treatment for 2 weeks failed to give him relief. At operation a large ulcer which perforated into the liver, and dense adhesions which caused a traction diverticulum of the duodenum were found. A gastroenterostomy, release of the traction diverticulum, and a vagus resection were performed. After 18 hours the patient suddenly died. At autopsy the cause of death was found to be pulmonary embolism.

Case 19.—Eight years before admission a diagnosis of duodenal ulcer was established in this 32-year-old man. His chief complaint was slight hematemesis on several occasions. He was admitted because of severe epigastric pain not associated with nausea and vomiting. Treatment for 3 weeks was unsuccessful. At operation a large ulcer crater was found in the duodenum. A vagus resection and posterior isoperistaltic gastroenterostomy were performed.

The postoperative course was uneventful. Two months later, roentgenograms revealed no ulcer. Three months postoperatively he had vomiting once or twice a week and gaseous distention in the morning after eating. Because of the repeated symptoms this patient is not considered to have been satisfactorily improved, even though he had no paid.

DISCUSSION

Of the 19 patients, 17 are living. A follow-up study for a period of 8 months to 2 years was done in 17. One died as a result of pulmonary embolism 18 hours following operation, and one died after an automobile accident. The actual mortality in this series is, therefore, 5.3 percent. Eighteen transabdominal resections and one transthoracic

vagus resection were performed. Fourteen, or 83 percent, showed satisfactory improvement in that they seldom had nausea or vomiting. All had complete relief from pain. An attempted explanation for the "failures" is offered. In a great number of these patients the complaints stemmed from psychosomatic impulses. To treat any patient with peptic ulcer, a full realization and understanding of their psychosomatic make-up, as well as a knowledge of the pathologic nature of the disease is indispensable.

Group I (*table 1*).—Six cases had vagus resection as the primary operation. These patients had fewer complications, a shorter duration of symptoms, and excellent results should have been obtained. Yet, two of the six required additional operation and one patient had a poor functional result.

TABLE 1.—*Vagus resection without other operation*

Case number	Age (years)	Duration of symptoms preoperatively (years)	Previous operation	Indication	Postoperative result
1	36	3	None	Pain	Poor, required further operation.
2	40	4	do	Pain and bleeding	Good.
3	38	2	do	do	Do.
4	33	2½	do	Pain	Poor, required further operation.
5	47	4	do	do	Good.
6	42	5	do	Pain and bleeding	Poor.

Group II (*table 2*).—The next seven cases had had previous gastric operations and had developed marginal ulcers with pain and bleeding as the most common complaints. Vagus neurectomy was successful in six cases. The seventh case was improved. The last six cases had some form of gastric drainage in addition to vagus neurectomy. This proved more satisfactory as five of the six patients had a good result.

TABLE 2.—*Marginal ulcer*

Case number	Age (years)	Previous gastroenterostomy (years)	Previous gastric resection	Indications	Postoperative result
7	35	2		Marginal ulcer	Good.
8	27		1 year	do	Do.
9	52	6		do	Poor.
10	47	8		do	Good.
11	52		1½ years	do	Do.
12	37		8 months	do	Do.
13	54		16 years	do	Do.

Group II includes those patients with marginal ulcer who have had previous gastric resection or gastroenterostomy. The symptoms were

intractable pain or bleeding or both. In this series of 7 patients, 6 (86 percent) were satisfactorily improved. The one who failed to improve had had a gastroenterostomy 6 years previously (case 9), and this patient required careful psychiatric readjustment. The average age in this group was 43 years.

Group III (table 3).—Group III includes those patients with intractable pain or bleeding, or both, and in whom either gastric resection or gastroenterostomy was performed at the time of vagus resection. In this series of 6 patients, 5 survived. One died with pulmonary embolism 18 hours postoperatively. Of the 5 who survived, 3, or 60 percent, had satisfactory improvement. The average age in this group was 41.

TABLE 3.—*Vagus resection combined with other surgical procedure*

Case number	Age (years)	Gastro-enterostomy	Gastric resection	Indications	Postoperative result
14	31	Yes	No	Pain and bleeding	Poor.
15	65	No	Yes	do	Good.
16	39	Yes	No	Pain	Do.
17	33	Yes	No	do	Do.
18	47	Yes	No	do	Death (due to pulmonary embolism 18 hours postoperative).
19	32	Yes	No	do	Poor.

Each patient had pre- and post-operative roentgenograms and the insulin-acidity test of Dragstedt. In all the cases complete vagus resection was performed as indicated by Dragstedt tests. The average preoperative Dragstedt tests were free HCl, 39°; total acid, 67°. Extreme high, 50° to 108° (in case 7). Extreme low, 20° to 30° (in case 9).

Postoperative Dragstedt tests average free HCl, 6°; total acid, 52°; extreme high, 20° to 110° (in case 7); extreme low 0° to 16° (in case 9).

Cases 7 and 10 are included in the improved group with their Dragstedt tests as follows: case 7, free HCl, 50°, total 108°; postoperative free HCl 20°, total 110°; case 10, free HCl 62°, total 78°; postoperative free HCl 34°, total 64°.

In the treatment for peptic ulcer the result as determined by the patient, in the final analysis, is the index of cure. Vagus resection, per se, is not a specific method for the treatment for the ulcer, and the interpretation of results by chemical analysis and by roentgenogram is not sufficient proof of the efficacy of the treatment. It is evident, however, that definite benefit has been obtained. There has been no recurrence of bleeding; pain has been relieved, and repeated periods of hospitalization have not been required.

Postoperative complications which occur are: gastric dilatation immediately postoperatively; diarrhea which occurs after convalescence; and pulmonary embolism which may occur after any surgical procedure. Of the three patients who had diarrhea, two were affected only intermittently every 1 to 2 months and were free from diarrhea 1 year prior to this report (cases 9 and 14). In one patient diarrhea persisted for 9 months until he was relieved by psychotherapy (case 3).

SUMMARY

Nineteen case reports of vagus resection are presented. The postoperative period of observation which ranged from 8 to 24 months is too short, and the number of cases too few to draw any definite conclusions. However, vagus resection is of value in relieving the intractable pain in peptic ulcer patients. It appears to be a good operation when other types of surgery have failed. It is effective in most cases of marginal ulcer. If pyloric obstruction is present, some type of drainage should be utilized at the same time. Many patients with peptic ulcers have an underlying psychosomatic condition which will not be relieved by any type of operation.

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Army Field Surgeon, Specialist

ROBERT P. WILLIAMS, *Brigadier General, MC, U. S. A.*[1]

IN THE next war we can be sure of two things: casualties will be produced on an unprecedented scale and there will be scant time to train medical officers after the war starts. Recognizing that all medical officers should have training in the care and handling of casualties in the field, Maj. Gen. Raymond W. Bliss, the Army Surgeon General, in the August 1950 issue of the Armed Forces Medical Journal, announced the plan for field training of medical officers. A new company officers' course, lasting about 4½ months, will begin in the fall of this year at the Medical Field Service School, Fort Sam Houston, Tex. Following this the students will continue for an additional 4½ months at the Army Medical Service Research and Graduate School in Washington, undergoing instruction in recent advances in field medicine which are applicable to war conditions. Graduates of the course may then be given 2 years of applicatory duty in which they will serve as unit surgeons or company or platoon commanders in medical battalions. Also, beginning in September 1950, the Medical Field Service School will offer an advanced course of about 9 months. This course is primarily for older officers who have been on professional duty. It may be followed by 2 years of duty as division or corps surgeon, or in the office of an army or theater surgeon, or in the Medical Section of the Office of the Chief of Army Field Forces.

All of this is definitely specialization. The specialty has been termed army field medicine and those who practice it could be known as army field surgeons. No special Military Occupational Specialty (MOS) has been assigned to it. The Medical Section of Army Field Forces and the Surgeon General's Office are now engaged in studying the criteria appropriate for such an MOS.

Many elements enter into the duties and responsibilities of the army field surgeon. First he must be qualified in two different professions: the medical and the military. To practice medicine in the field or in combat, he must not only be proficient in medicine and surgery but also he must be able to obtain results with the limited facilities available and under such adverse local conditions as excessive heat or cold,

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mud or dust. Although major surgery is not ordinarily attempted in the forward field installations, it sometimes becomes necessary and it is for such circumstances that the army field surgeon must be prepared. In addition to having a wide knowledge of the more common medical specialties, he must be trained in tropical medicine and in the recognition and treatment of conditions peculiar to his environment. As a staff officer he will advise his commanding officer on medical and sanitary matters. This will require a broad understanding of preventive medicine applied on the basis of familiarity with the organization, duties, and mission of the military unit. Finally, the army field surgeon in many instances is a commanding officer, responsible for the training, discipline, and morale of his medical unit. Although his command may be small, it calls for a high degree of leadership. Having trained his men in a variety of technical skills, he will find that many of them, such as company aid men, litter bearers, and ambulance drivers, will be employed away from his immediate control. Often they will be busy while other members of the unit are resting. Their skill and morale must be such as to inspire confidence because the patients they handle when they are on their own must have respect for their judgment and believe that they are in proper medical hands.

It is proposed that the MOS for the army field surgeon be in grades A, B, C, and D as are the medical professional specialties. Details are now being worked out. Only the broad principles can be announced at this time.

For instance, Grade D might be awarded on satisfactory completion of the company officers' course at the Medical Field Service School followed by 2 years of applicatory duty with a field medical unit. Because most of these officers on attaining this specialty rating will be assigned next in Army hospitals or on residency training, they will retain the MOS as long as they are in company grades. On promotion to field grade, requalification by attending the advanced course at the Medical Field Service School and by 2 years applicatory duty will be required.

Higher classifications in this MOS would be reserved for officers who enter army field medicine as a career. Grade C might be awarded a medical officer holding a D rating who is also a graduate of the Infantry, Artillery, or Armored School and of the Command and General Staff College. Grade B would require a short course in preventive medicine at the Army Medical Service Research and Graduate School and also graduation from the Armed Forces Staff College. Grade A would be reserved for medical officer graduates of the Army War College. Each of these school courses must be followed by an applicatory tour of duty with a field unit or a refresher professional assignment in an Army hospital.

In the study of appropriate criteria for the various grades of the MOS for the army field surgeon, cognizance will be taken of the fact that some officers now beyond the age limit for several of the service schools, nevertheless have had field or combat experience which might be considered equivalent to such school courses.

The response thus far to the reopening of army field medicine as a field for both general training and specialization has been very encouraging. Many medical officers engaged in recent maneuvers have voiced interest in field work and have inquired particularly as to what provisions are being made for this specialty.

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The Clinical Use of Antibiotics

II. Prophylaxis of Infections [1]

PERRIN H. LONG, *Colonel, MC, A. U. S.*[2]

TOO MUCH hope has been placed in the prophylactic use of the sulfonamides and antibiotics against infection. Although in many instances this hope has not been justified, medical and dental officers should take advantage of the known prophylactic uses of the antibiotics.

CHOLERA

Experimental data [3] indicate that the administration of 2 to 4 grams of chloramphenicol a day might constitute effective prophylaxis against cholera. Such a regime could only be recommended for trial during an epidemic period, and in persons who were contacts of patients with cholera, or who through their occupation were exposed to infection. Such prophylaxis, if started, should be continued until the chance of contracting cholera is past.

GONOCOCCAL INFECTIONS

The observations of Harry Eagle and his coworkers indicate that the oral administration of a single dose of 250,000 units of crystalline penicillin G within a few hours after a sexual exposure to gonococcal infection will prevent the occurrence of this disease in a high percent of instances. Certainly, the intramuscular administration of 300,000 units of procaine penicillin G in aqueous suspension is effective in preventing gonococcal infection.

HEMOLYTIC STREPTOCOCCAL INFECTIONS

The experience during World War II clearly indicates that the use of sulfonamides for prophylaxis in the mass of hemolytic streptococcal

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[1] The second of four articles on this subject. The first appeared in the August issue.

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[3] GAULD, R. L.; SCHLINGMAN, A. S.; JACKSON, E. B.; MANNING, M. C.; and BASTON, H. C.: Chloramphenicol (chloromycetin) in experimental cholera infections. J. Bact. 57: 349–352, Mar. 1949.

infections in man is unwise. Whenever this procedure was attempted on a large scale, it was followed by outbreaks of infection produced by strains of the hemolytic streptococci which were resistant to sulfonamides. While similar experiences in man were not obtained with penicillin, there is a likelihood that the same result might be obtained if the latter drug were used under similar conditions. The only time when it is feasible to attempt the prophylaxis of hemolytic streptococcal infections is in relatively small groups that are closed, such as in orphanages, hospitals, penitentiaries and aboard ship. If penicillin is used, give 100,000 units by mouth four times a day for 3 or 4 days. If penicillin is not available, one of the sulfonamides (preferably sulfadiazine or sulfamerazine) given in appropriate doses would probably prove successful. As with penicillin, the sulfonamide employed should be given over a period of 3 or 4 days. Recent experimental tests with aureomycin seem to indicate that this drug in doses of 1 to 2 grams a day can be used as a prophylactic agent against hemolytic streptococcal infections. Certainly, if experimental data can be carried over into the clinical field, it would appear that streptococci will not easily develop a high degree of resistance to the antibacterial effects of aureomycin.

MENINGOCOCCAL MENINGITIS

The prophylaxis of this disease in men may be effected by the administration of one of the diazines or penicillin. In adults, 2 grams, three times a day administered for 1 day to all persons exposed to infection will arrest an epidemic of meningitis. This effect will be maintained until invasive strains of the meningococci once more appear in the group that has been treated. There is little doubt that the administration of penicillin in doses of 250,000 units every 4 hours would accomplish the same purpose.

OPHTHALMIA NEONATORUM

Since in most States the Credé method for the prophylaxis of ophthalmia neonatorum is required by law, and any variation from this method is illegal, the use of penicillin for this purpose cannot be recommended. Also, the frequency with which sensitivity is produced by the use of penicillin in the conjunctival sacs makes this an undesirable method for the prophylaxis of gonococcal infection in the eye. If, however, the Credé method appears to have failed, then treat with crystalline penicillin G in doses of 5,000 units given intramuscularly at intervals of 3 hours. Frequently apply an ophthalmic ointment containing 100,000 units of crystalline penicillin G per gram to the conjunctivae. This will bring about a cure within 2 or 3 days.

PUERPERAL SEPSIS

Unless otherwise contraindicated, every woman in prolonged or difficult labor should receive 0.5 gram of aureomycin by mouth at intervals of 6 hours during the period of labor and for 48 to 72 hours afterwards. If this antibiotic is not available, use procaine penicillin G with added crystalline penicillin G given intramuscularly in aqueous suspension at intervals of 12 hours during the period of difficult labor and for 24 to 48 hours afterwards.

RHEUMATIC FEVER

The administration of 1 gram of sulfadiazine daily to children 3 to 12 years of age who have had one or more attacks of rheumatic fever, during the period in which they are exposed to hemolytic streptococcal infections (generally 15 September to 15 May) will protect most of them against a recurrence of the rheumatic infection. Penicillin by mouth will produce the same effect. If crystalline penicillin G is to be used, a suggested dosage would be 100,000 units four times a day by mouth for the first week of each month during the period in which the child is exposed to infection. The usual checks used in patients undergoing prolonged sulfonamide therapy should be observed.

SUBACUTE BACTERIAL ENDOCARDITIS

It is very important to place every person who has a quiescent rheumatic fever or an organic heart lesion on specific chemotherapeutic or antibiotic prophylaxis before performing operations in or about the mouth, throat, nose, or intestinal tract. This injunction includes the extraction of teeth. Use procaine penicillin G with crystalline penicillin G added. Give 2 hours before the operative procedure and repeat once or twice or more as conditions seem to indicate at intervals of 12 hours after the operation. Other preparations of penicillin may be used if the one recommended is not available. Lacking penicillin, use aureomycin in doses of 2 grams a day.

SURGICAL CONDITIONS

Clean surgical operations.—Although there are a certain number of surgical procedures that are known as "clean" and in which under normal conditions the incidence of postoperative infection is less than 10 percent, in certain special instances such as cataract extraction, corneal transplantation, and intraocular operations in which the conjunctivae are infected, postoperative infection is to be avoided at all costs. In such patients (if adults) give procaine penicillin G with crystalline penicillin G added in aqueous suspension intramuscularly 2 hours before operation and repeat at intervals of 12 hours for 4 doses

after the surgical procedure has been completed. Start 12 hours before the operation and continue for 48 to 72 hours afterward. Lacking penicillin, use aureomycin in doses of 2 grams a day, starting 24 hours before operation and continuing for at least 3 days afterward.

Colonic operations.—The oral administration of sulfonamides and/or antibiotics that are bacteriostatically active in the gastrointestinal tract may be used as a pre- and post-operative measure for decreasing infection incident to colonic operations. Originally sulfaguanidine was used for this purpose; later, sulfasuxidine or sulfathalidine was used. In the last few years a combination of sulfasuxidine and streptomycin by mouth, or aureomycin or chloramphenicol has replaced the use of the sulfonamides. The aim in this type of therapy is to so lower the bacterial content of fecal material in the colon that the risk incident to soiling the peritoneal cavity or the wound itself will be greatly lessened. It is difficult to say which is the method of choice for pre- and post-operative preparation of the bowel for surgical procedures. If a combination of sulfasuxidine and streptomycin is used, give 1 gram of sulfasuxidine every 4 hours and 1 gram of streptomycin every 6 hours by mouth for 4 days before the operation and then continue this regime for from 7 to 10 days postoperatively. If chloramphenicol is to be used, 1 gram four times a day over the same period could be used. With aureomycin the dose would be 0.5 to 0.75 gram four times a day.

Pulmonary operations.—In surgical procedures that are being performed in infected or potentially infected areas of the lung, it is a good plan to do everything possible to minimize the spread of infection prior to, during, and after operation. As pulmonary infections are generally caused by a mixture of gram-positive and gram-negative bacteria, the antibiotic of choice for the control of the infection would be aureomycin. It should be administered in the doses recommended for moderately ill patients for 4 days before the operation and postoperatively for 7 to 14 days, depending on the patient's general condition. Chloramphenicol, given in the doses recommended for moderately ill patients, may also be used to minimize the spread of infection incident to pulmonary operations. If these antibiotics are lacking, a combination of procaine penicillin G and streptomycin, both given intramuscularly, could be used.

Established surgical infections.—It is a good plan, if the surgical treatment of an established infection has been decided on, to administer a sulfonamide or antibiotic before and after operative procedures have been completed. This will frequently prevent the spread of the infection and will tend to insure a rapid and uneventful convalescence. The agent of choice should be the antibiotic that is known to be most effective against the infecting organism and safest

for the patient. If time permits, it should be administered for from 24 to 48 hours prior to operation, and then it should be continued for from 5 to 7 days (or longer if indicated) after the surgical procedure has been completed. The dosage of the agent usually should be based on those used for the treatment of moderately ill patients (or suitable variations of those schedules).

Impending surgical infections.—This is the term and conception which Col. E. D. Churchill, Surgical Consultant, Mediterranean Theater of Operations, U. S. Army, developed in respect to what was then termed "prophylaxis of wound infection" during World War II. All wounds that result from external violence are probably contaminated and/or potentially infected with micro-organisms. In the treatment of impending infection in wounds, the choice of the antibiotic should be made with special reference to the one that has the widest range of action against bacteria. At present this is aureomycin; hence it should be used in adults in doses of 0.5 gram four times a day in the treatment of impending surgical infections. Lacking aureomycin, use 300,000 units of procaine penicillin G with 100,000 units of crystalline penicillin G added, and give intramuscularly in watery suspension at intervals of 8 to 12 hours. Crystalline penicillin G or procaine penicillin G in vegetable oil with 2 percent aluminum monostearate added may also be used in the treatment of impending surgical infections.

Uncommon Antibiotics

DICUMAROL is derived from spoiled sweet clover. In addition to its effect on prothrombin, it is antibacterial for gram-positive bacteria and inhibits *Staphylococcus aureus*, *Staph. albus*, and *Staph. pyogenes* in a dilution of 1 : 50,000.

PATULIN is derived from *Penicillium patulum* and appears to have some effect against gram-positive and gram-negative bacteria commonly present in the nasopharynx. It is used in a solution of 1 : 10,000 as a topical application or as a nasal spray.

TOMATIN is obtained from the "Pan American" and "red currant" tomato plants. It is active against *Staphylococcus aureus* and *Bacillus subtilis* and is highly effective against certain human dermatocytes belonging to *Fungi imperfecti* such as *Trichophyton mentagrophytes*, *Epidermophyton floccosum*, and *Microsporum audouini*.

PYOCYANIN is obtained from cultures of *Pseudomonas pyocyanea*. In a 1 : 5,000 dilution it inhibits the growth of pathogenic fungi such as *Achorion schoenleini*, *Microsporum gypseum*, *Trichophyton gypseum*, and *Candida albicans*.

HEMIPYOCYANIN is obtained from cultures of *Ps. pyocyanea*. It is active in dilutions of from 1 : 20,000 to 1 : 60,000 against *Achorion schoenleini*, and *Candida albicans*. However, from a clinical report by Hopkins et al., hemipyocyanin appears to have no advantage over commonly used fungicides.

SHREDDED CABBAGE releases a substance bactericidal to *Bacillus coli* and, to some extent, to *Staphylococcus aureus;* Peders and Fisher reported this in 1944.

Relation of Nitrate Nitrogen Concentration in Well Water to the Occurrence of Methemoglobinemia in Infants

KENNETH F. MAXCY, *M. D.*[1]

IN 1945 Comly (*1*) advanced the hypothesis that the so-called idiopathic methemoglobinemia [2] in infants may be caused by the ingestion of well water containing large amounts of nitrates. In the 4 years that have elapsed since the publication of Comly's article, this hypothesis has received much attention and the observations that have been made establish its validity. During this period, a large number of cases of methemoglobinemia in infants have been reported (*2*) (*3*) (*4*) (*5*) (*6*) (*7*) (*8*) (*9*) (*10*) (*11*) (*12*) (*13*) (*14*) (*15*) (*16*). In every case the baby had been fed on an artificial formula made with cow's milk, condensed milk, or milk powder *diluted with well water.* None of the infants was breast-fed only. Usually the wells from which the water was obtained were dug rather than drilled, had inadequate casings or none at all, were unsatisfactory with regard to location and construction, and, in many instances, showed evidence of pollution. Where the well water was subjected to chemical analysis, with two or three questionable exceptions, it was found to have a high content of nitrate of nitrogen and occasional traces of nitrites.

In some cases it was observed that with temporary discontinuance of the formula, the cyanosis produced by the methemoglobinemia cleared up only to reappear when artificial feeding was resumed. When the formula was changed to one made up of water having low nitrate nitrogen content, the cyanosis disappeared. If untreated,

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[1] Consultant to the Surgeon General, Department of the Army.

[2] Methemoglobinemia designates the presence of methemoglobin in the blood. Some portion of the heme in the oxyhemoglobin molecule has been oxidized, ferrous ions being converted into ferric ions. Oxygen is so firmly bound that it cannot function in respiration. The color of the blood is changed from the normal deep red to a chocolate brown, giving a cyanotic tint to the skin. Methemoglobinemia may result from the ingestion and absorption of such drugs and chemicals as aniline, nitrobenzene compounds, acetanilid, sulfonamides, chlorates, and bismuth subnitrate.

the disturbance increased and sometimes was fatal. Thus, as a result of a special survey in Minnesota (*17*), 139 cases were discovered and reported; there were 14 deaths, a case fatality rate of 10 percent. Roughly, this would indicate an incidence of 1 case per 1,000 live births per annum in the State as a whole.

Susceptibility to the development of methemoglobinemia rapidly decreased after the first 2 months of life and after 6 months was rare. Although not definitely established it would appear that many of the siblings of patients who had been fed previously on formulas using the same well water had no trouble of this sort. Adults consumed such water with impunity.

Previous experimental studies have established that nitrates as such are harmless in human metabolism but become injurious to the extent that they are reduced and absorbed into the blood stream as nitrites (*18*). Methemoglobinemia is a manifestation of nitrite poisoning. From the observations of Bohme (*19*), Roe (*20*), and others on bismuth subnitrate poisoning, it was made clear that the reduction of nitrates to nitrites could occur in the human intestine; that the extent to which it took place was subject to wide individual variation; that it depended in part on the characteristics of the bacterial flora of the intestinal tract; and that conditions favoring this reduction were more likely to be found in infants. Cornblath and Hartmann (*21*) have published additional evidence to support this concept. They were successful in producing methemoglobinemia experimentally in certain infants by feeding them formulas made with well water to which nitrates had been added in known amounts, and were inclined to believe from their observations that conditions favorable to the reduction of nitrates and the subsequent absorption of nitrites into the blood stream are realized only in infants in whom the *p*H of the gastric juice is higher than 4.9, permitting nitrifying bacteria to grow in the upper intestinal tract.

It seems likely that other factors, not at present understood, are also concerned in the predisposition of certain infants to the development of methemoglobinemia from consumption of nitrates as they occur naturally in water. The evidence at hand justifies the belief that this predisposition is extremely rare after the first few weeks of life, and that in older children and adults the danger is negligible. The range of concentration of nitrate nitrogen in samples of well water involved in the causation of methemoglobinemia is shown in table 1. Sufficient clinical data were not available on the two wells in which the water contained 10 to 20 p. p. m. of nitrate nitrogen, so that they must be considered questionable. The samples from many of the 25 that contained 21 to 50 p. p. m. were collected a year or more after a case of methemoglobinemia had occurred, and in some

instances the well had been abandoned subsequent to the discovery of its involvement. The nitrate content of a private supply may fluctuate. The lowest nitrate nitrogen concentration of a sample collected at the time of the infant's illness was 36 p. p. m. The average nitrate nitrogen concentration of all the wells suspected of causing methemoglobinemia was 102 p. p. m. The Minnesota experience is representative of findings elsewhere (*22*) (*23*) (*24*) (*25*) (*26*). The borderline of safety cannot be sharply fixed because of other variables involved. The dangerous concentration of nitrate nitrogen depends on individual susceptibility, how long the water is boiled in preparation for use in infant feeding, the total quantity of water consumed per day in proportion to body weight, age, and the length of time exposure is continued. The evidence so far accumulated lends support to the concept that the danger zone begins when a concentration of 20 p. p. m. is exceeded, although the report of the Committee on Water Supply of the Engineering Section (*27*) points out that a majority of the cases studied were associated with concentrations in excess of 40 p. p. m. Pending the collection of further evidence, caution is advisable in fixing the limit of safe concentration.

TABLE 1—*Number of wells implicated in relation to nitrate nitrogen concentration* [1]

	Concentration of nitrate nitrogen in p. p. m.				
	0-9	10-20	21-50 [2]	51-100	Over 100
Dug well	0	2	24	51	48
Drilled wells	0	0	1	2	1

[1] From reference 17.

[2] A later communication from Mr. F. L. Woodward, Assistant Chief, Section on Environmental Sanitation, Minnesota State Board of Health, gives the following breakdown of nitrate nitrogen content in the wells where water with 21 to 50 p. p. m. was implicated:

Concentration of nitrate nitrogen in p. p. m.:	*Number of wells*
21–29 (including 1 drilled well)	8
30–39	8
40–49	8
50	1
Total	25

In samples of water from private wells not implicated in the causation of methemoglobinemia, but located in three counties of southwest Minnesota, the concentration of nitrate nitrogen is shown in table 2. The Minnesota study revealed a high degree of association between nitrate nitrogen content and either insanitary location or faulty construction, or both. Similar findings are reported from Iowa, Illinois, Ohio, and Saskatchewan (*23*) (*24*) (*25*) (*26*). Proper location and construction, however, does not insure low nitrate nitrogen content in certain areas. Instances were encountered in which water from deep drilled wells, apparently perfectly satisfactory from the point of view

of location and construction and showing no evidence of bacterial pollution, were found to have high nitrate content.

TABLE 2.—*Concentration of nitrate nitrogen in wells not implicated* [1]

	Concentration of nitrate nitrogen in p. p. m.				
	0–9	10–20	21–50	51–100	Over 100
Dug wells:					
Schools	48	1	1	0	0
Farms	30	11	13	13	2
Drilled wells:					
Schools	77	0	0	0	0
Farms	51	9	4	0	0

[1] From reference 17.

The cases of methemoglobinemia so far reported have a peculiar geographic distribution. They have originated in Iowa, Illinois, Minnesota, Nebraska, Missouri, Kansas, Michigan, Indiana, North Dakota, New York (two cases), Manitoba, Saskatchewan, and Ontario. The significance of this geographic concentration in the North Central United States and the central Provinces of Canada is not yet clear. The first question to be answered is whether this geographic concentration of cases is real or apparent. Physicians are not required to report methemoglobinemia to health authorities. Present-day knowledge of the occurrence of cases is derived from voluntary reports in journals and the published results of special inquiries undertaken in a few States, centering about Iowa, where the condition was originally described. It must be conceded, therefore, that the geographic limits of the occurrence of this condition have not yet been established by systematically collected information. Nevertheless, it seems unlikely that with the attention given this subject in medical journals, it would have escaped recognition in other parts of the United States and Canada. While the area from which cases of methemoglobinemia are reported may, in time, be enlarged, there is justification for the assumption that the geographic concentration of cases is a significant fact that requires explanation if intelligent preventive measures are to be taken.

One hypothesis is that it is directly related to the frequency with which infants are placed on artificial formulas made with well water in the first few months of life. While this frequency would undoubtedly vary in different parts of the country and with social, economic, and cultural backgrounds, the variation would hardly seem to be sufficient to play a major role in the geographic distribution of cases. A second hypothesis is that in this particular section of the country well waters with high nitrate count are more frequently encountered than in others.

The following summarizes our knowledge on this subject (*28*):

The ground waters of the United States contain varying amounts of nitrate derived from many sources. Among these are human and animal wastes and both organic and inorganic fertilizers. In some instances nitrogenous industrial wastes may give rise to high nitrate waters. However, ground waters may have a high nitrate content in areas where no such sources are present, or are present to an extent much too small to account for the large amount of nitrate. The source of nitrate in such cases has not been explained.

There are undoubtedly variations in the amount of nitrogenous material present at the surface or within a water-bearing formation and the rate at which it becomes available in the form of nitrate. The differences in the amount of nitrate from place to place are influenced by the rate of circulation of the water, the amount of recharge and location of recharge areas, the location of discharge areas, and the length of time that present conditions have existed.

The Geological Survey has made many thousands of chemical analyses of ground waters collected in all parts of the country during the past several decades. In general, natural waters do not contain more than 5 to 10 p. p. m. of nitrate. In a few areas in the United States nitrates in ground waters are found ranging up to 100 p. p. m. or even more. Such occurrences have been observed in Texas, Kansas, New Mexico, and in a number of our Western localities. Nitrate concentrations up to several hundred p. p. m. are not unusual in certain parts of Texas.

While only preliminary studies have been made of these data, it is apparent that the nitrate in ground water is not affected materially by rainfall or that the nitrate salts are being continuously replenished. There appears to be little relation between the occurrence of high nitrates in ground waters and the intensity of developments in the area. In Texas most of the waters containing high nitrate were obtained from wells less than 200 feet deep. We do not know definitely the relationship of high nitrate concentrations of ground waters to the geologic age of the water-bearing sands. Indications are that in Texas the formations of a younger age usually may be expected to yield a greater preponderance of high nitrate waters.

No map showing the location of these areas of high nitrate concentration in the United States has been compiled, but there is definite information that numerous rural private (household) wells in Texas yield water containing 22 to 133 p. p. m., and Oklahoma reported an average nitrate content of 28 p. p. m. for 415 wells with a maximum concentration of 638 p. p. m. (*27*). The experience of New York State (*27*) is reflected in the results of chemical examinations made from 1943 to 1946, inclusive, in connection with the supervision of public and private water supplies. In this period, 18,013 samples from ground water sources, wells, and springs were analyzed. Of these, 175 (all from private water supplies) had a concentration of 20 p. p. m. or more of nitrate nitrogen distributed as follows:

	Concentration of nitrate nitrogen p. p. m.			
	21–30	31–40	41–50	51–100
Number of samples	112	36	8	19

Although the proportion of such supplies is small (1 percent of the total) in comparison with the frequency reported in the North Central States, it is not negligible. As yet only one authenticated and one suspicious case of methemoglobinemia has been recognized in New York and none in Oklahoma or Texas. Such observations could be extended by reference to other reports.

A similar observation has been made with regard to public water supplies secured from wells and springs. Such supplies are carefully protected from pollution and in general rarely have more than 20 p. p. m. of nitrate nitrogen. Occasionally, however, supplies are encountered that have much higher concentration. For example, of 550 public ground-water supplies in Illinois only 2 were shown to have a nitrate nitrogen content greater than 45 p. p. m. (*29*). A 95-foot well at Hartsburg, Ill., was found to yield water of 123 p. p. m. nitrate nitrogen after 5 minutes of pumping. An 80-foot well at Mt. Pulaski, Ill., was found to contain 274 p. p. m. of nitrate nitrogen on one occasion and 83.5 on another. In neither instance was there evidence of pollution. The water at Mt. Pulaski had been in use for over 40 years.

It would be expected that, among populations of small towns and small cities served by such supplies, cases of methemoglobinemia would have been discovered and reported. As yet, however, no cases of methemoglobinemia have been reported from a public water supply secured from wells or springs. With regard to public water supplies obtained from surface streams, water containing more than 5 p. p. m. of nitrate nitrogen is rarely encountered. A recent review of the experience in New York State from 1943 to 1946 indicates that of 1,547 samples from surface supplies only 2 contained 10 to 15 p. p. m. of nitrate nitrogen (*27*).

There is, however, a possible hazard created through the discharge of industrial wastes. This is illustrated by the experience of Warren, Ohio (*26*). Since the war, several plants, built originally for the production of trinitrotoluene, have been converted into plants producing ammonium nitrate for use as fertilizer. Wherever such plants are situated there is a possibility of direct contamination of surface waters. While no cases of methemoglobinemia have as yet been traced to such sources the potential hazard exists and the health authorities should be alerted to it.[3]

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[3] The following recommendations are made toward minimizing and controlling waste water from plants producing ammonium nitrate for use as fertilizer: (*a*) Allow the operation of such plants only in areas where there is practically no danger of water supply contamination by the plant wastes. (*b*) Increase plant housekeeping efficiency to the highest level consistent with economical plant operation. Attention should be given to the conservation of plant products. This conservation should be practiced to eliminate nitrate waste discharge rather than to recover its value. Through recent efforts of the Army

SUMMARY

Water supplies derived from springs and wells, whether public or private, which have a high nitrate nitrogen content are distributed over a much wider geographic area than are the cases of methemoglobinemia as yet reported. So far the cases have been associated only with the use of water from private household supplies of well water. These observations lead logically to a question of the nature of the factor or factors that are required in addition to high nitrate content in the causation of this condition and that are peculiar to the geographic area of its occurrence. The hypothesis might be advanced, for example, that causation is not determined alone by the age of the infant, the quantity of water ingested, and the concentration of nitrate nitrogen of the water used for dilution of the formula, but that there is a difference between nitrate nitrogen derived from organic and inorganic sources, or that it is necessary to have present some additional factor or factors derived from biologic activities in the soil or in the well water to insure the breakdown of nitrates into nitrites after ingestion by the infant. These and similar questions cannot yet be answered. There is urgent need for further study before comprehensive preventive measures can be advocated. Such a study would be facilitated if it were organized on a basis that would permit observations in various parts of the United States by the same unit. This unit should consist of an epidemiologist, a pediatrician, a sanitary engineer, a biochemist, and a bacteriologist, with the needed laboratory facilities. The problem is of sufficient importance to justify the interest of the Federal Government.

CONCLUSIONS

1. Further studies should be made of the relation of the nitrate nitrogen content of well waters to methemoglobinemia in infants.

2. Pending such studies, health authorities in the States and Provinces concerned should be advised that water from private household

Footnote 3 continued.
Industrial Hygiene Laboratory, the loss of material being processed from one such plant was reduced about 75 percent. This was accomplished by following good housekeeping techniques in handling the materials throughout the plant with increased respect from the standpoint of waste. (*c*) Maintain constant surveillance of such plants, their wastes, and the effects of these wastes on surface and ground waters in the area through appropriate Federal and State agencies. Lagooning waste water from such plants is not an ultimate solution because of the danger of constant leaching of the nitrates into the soil and ground water. At present there appears to be no feasible treatment method for nitrate wastes. The only recognized possibility is the use of biologic ponds wherein the nitrates become food for plants that are in turn consumed by animal life. (*d*) Emphasize the importance of nitrite as well as nitrate nitrogen in these problems as the nitrite content may be responsible for methemoglobinemia. (R. E. Fuhrman has prepared these findings in connection with studies being made for the Committee on Sanitary Engineering and Environment, National Research Council.)

wells having nitrate nitrogen content in excess of 10 p. p. m. be regarded as unsafe for infant feeding.

3. No safe limit for nitrate nitrogen content in public water supplies should be fixed at present.

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Antibiotic Drugs in Venereal Disease Therapy

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BECAUSE of the widespread use of antibiotic drugs, the number of patients sensitive to one or more of these agents is increasing. The desirability of having an alternative antibiotic drug for the sensitized patient is, therefore, becoming increasingly important. Although the optimum dosage and duration of therapy have not yet been standardized, numerous schedules with antibiotic drugs have been found to cure venereal diseases.

GONORRHEA

The drugs of choice in the treatment of gonorrheal urethritis are penicillin, aureomycin, streptomycin, and the sulfonamides. The dosage and results of sulfonamide and penicillin therapy are well known and need not be discussed. Aureomycin hydrochloride given orally in doses of 1 to 3.5 gm. over a period of 12 to 36 hours is highly effective against acute gonorrheal urethritis. In a large series of cases (*1*) 92.6 percent of the patients were cured with a single course of treatment. The results are, therefore, inferior to those obtained with a single intramuscular dose of 300,000 units of crystalline penicillin in beeswax and peanut oil. In a small series of cases at this hospital we have not as yet encountered any failures in patients given a total of 3 gm. in doses of 0.5 to 1 gm. every 8 hours. The effects of aureomycin, given orally, on the clinical and bacteriologic findings are similar to those observed with penicillin although they occur more slowly. The urethral discharge generally becomes less profuse or ceases entirely within 24 hours. With this small dosage, toxic effects were not observed. Aureomycin is of value in patients sensitive to penicillin or in the so-called "penicillin-resistant" cases. Aureomycin in the dosage recommended, is also of value in treating gonorrheal urethritis in patients with coexisting syphilis. With the small dose cited, aureomycin did not affect the darkfield examination or the sero-

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logic tests for syphilis in contrast to the effects of penicillin in the treatment of gonorrhea. Streptomycin is also effective in the treatment of gonorrhea. In a large series of cases (*2*) a single intramuscular injection of 0.3 to 0.6 gm. of streptomycin in an aqueous solution resulted in the cure of 90 percent of the patients. Patients failing to respond to this initial injection were reported as being cured by a second treatment with a slightly larger amount of streptomycin. Since streptomycin in such small doses does not inhibit the activity of the spirochete, it does not prevent the appearance of the early clinical manifestations nor does it prolong the incubation period of syphilis, as is the case with penicillin. Preliminary reports indicate that chloramphenicol will be effective in gonorrheal urethritis.

LYMPHOGRANULOMA VENEREUM

The drugs of choice in lymphogranuloma venereum are aureomycin (*3*) and the sulfonamides. Numerous dosage schedules, including 20 mg. of aureomycin given intramuscularly every day for 10 consecutive days, have proved effective. Because severe local pain and toxic reactions often occur at the site of the injection, it is more practical to prescribe 0.5 gm. orally every 8 hours until the condition is cured. The usual dose of sulfathiazole or sulfadiazine is 1 gm. four times a day for 10 to 21 days or until the lesions heal.

CHANCROID

The drugs of choice in the treatment of chancroid are aureomycin, the sulfonamides, and streptomycin. At this hospital, using aureomycin in doses of 0.25 to 0.5 gm. every 8 hours until the lesions were completely healed, the stay in the hospital was shortened, compared to the hospitalization formerly required with sulfonamides. Toxic effects have seldom been observed and discontinuance of the drug for that reason is usually not necessary. Sulfathiazole or sulfadiazine, having the advantage of lower cost, are generally prescribed in doses of 1 gm. four times a day until the condition is cured (usually 7 to 21 days). Streptomycin, although effective (*4*), is no more so than sulfathiazole and has the disadvantage of intramuscular injection. Streptomycin would be indicated in sulfonamide-sensitive patients in whom coexisting lesions of syphilis are believed to be present. Aureomycin, administered in sufficient quantity to cure chancroid, may prevent the appearance of the early clinical manifestations of syphilis or prolong the incubation period. It is, therefore, advisable to follow all patients receiving aureomycin with monthly serologic tests for syphilis on completion of therapy.

GRANULOMA INGUINALE

The drugs of choice in granuloma inguinale are chloromycetin, aureomycin, and streptomycin. Chloromycetin, administered orally in doses of 0.5 gm. every 6 hours for 10 to 15 days until 20 to 30 gm. have been given, has proved effective in treating this disease (*5*). Donovan bodies disappear more rapidly from the lesions than when streptomycin or aureomycin are used. Healing occurs before the therapy is completed or 2 to 3 weeks following completion of therapy. Resistance to chloromycetin has, in contrast to streptomycin, not been encountered. The toxic effects of chloromycetin have been negligible. Although the recommended dosage of streptomycin is 4 gm. a day given intramuscularly in divided doses for 5 consecutive days, the author believes that this dosage is too large and prefers to give 1 gm. a day in divided doses for 15 to 20 days. About 10 percent of all patients treated with streptomycin eventually have a relapse (*6*). A few streptomycin-resistant patients have been reported. Aureomycin has proved effective in these patients and in those who relapse following treatment with streptomycin (*7*). It has, however, the disadvantage of occasionally causing nausea, vomiting, and diarrhea because of the relatively large total dose required and because of the longer duration of therapy in this disease.

SYPHILIS

The drugs of choice in the treatment of syphilis are penicillin and aureomycin. Two treatment schedules for the treatment of primary, secondary, and latent syphilis are recommended: (*a*) penicillin G in aqueous solution administered every 3 hours, night and day, for 8 consecutive days and using a total of 4,800,000 units; or (*b*) crystalline penicillin G in peanut oil and beeswax (or procaine penicillin in oil), given in 10 consecutive daily injections of 600,000 units each. At present the latter schedule is being used in the Army. The failure rate varies in different clinics, but is probably less than 10 percent when reinfections are considered. Treatment with penicillin alone in early syphilis is as satisfactory as when combined with arsenic and bismuth preparations. The recommended total dose in congenital syphilis varies between 100,000 and 400,000 units per kilogram of body weight, given in divided doses for 8 days. In the treatment of neurosyphilis a total of 9,000,000 to 15,000,000 units in divided doses for 15 to 21 days is recommended. This may be in either an aqueous solution or in a peanut oil and beeswax base. The Army prescribed 96 consecutive intramuscular injections of 100,000 units each of aqueous penicillin G, given every 3 hours for 12 days. Numerous experiments are in progress in which procaine penicillin in oil with aluminum mono-

stearate is being used. In one such experiment 1,200,000 units are being given in a single intramuscular dose for the treatment of primary and secondary syphilis. The results with this method have been promising.

Aureomycin, although not as effective as penicillin, has been used successfully in the treatment of syphilis (*8*) (*9*). Following either oral or intramuscular administration it is readily absorbed into the blood stream and is capable of diffusing through the placenta. Unlike penicillin, aureomycin has been demonstrated in the spinal fluid. The changes in the cerebrospinal fluid findings have been similar after either aureomycin or penicillin therapy. Herxheimer reactions are commonly noted in syphilitic patients receiving aureomycin and this phenomenon should be remembered whenever an unexplained rise in temperature occurs following the administration of aureomycin. The Herxheimer reaction may be observed 24 to 36 hours after initiating therapy. Aureomycin appears, therefore, to have the widest range of any known antibiotic drug in the treatment of venereal diseases.

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Early Detection of Carcinoma of Cervix Uteri

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THE cytologic study of smears of the cervix uteri for the detection of cancer has proved to be of undeniable value. The Departments of Pathology and of Gynecology, U. S. Naval Hospital, San Diego, Calif., have undertaken a joint study to evaluate the accuracy and practicability of the smear technique for cancer detection as advocated by Papanicolaou and Traut (*1*). This report is an evaluation of the results obtained with this technique in the detection of malignancy of the cervix uteri.

MATERIALS AND METHODS

Preliminary tests were made in an attempt to evaluate various cell staining methods. The stains compared were the hematoxylin-eosin, Hortega's silver stain, and the Papanicolaou-Traut stain (*1*) (*2*). The technique of procuring the smear was standardized by utilizing the cervical surface method as described by Ayre (*3*) (*4*). This was modified in that a standard tongue blade was cut down to conform more readily to the cervical os; by rotary movement, the wooden blade procured cervical material. This was smeared on a slide and immediately immersed in a solution of equal parts of 95 percent ethanol and ethyl ether. After a minimum of 15 minutes of fixation, the slide was air dried and sent to the laboratory. Three slides were prepared for each case.

Smears of the first 200 cases were stained by the three staining methods referred to previously and examined for cytologic evidence of malignancy. Thus a comparative series of cases were studied for staining efficacy. It was found that the cells characteristic of cancer could be detected by Hortega's silver stain, "H and E," or Papanicolaou's method. However, the cellular detail was superior with the latter two stains. It was also noted that more information relative to hormonal effects on the desquamated cervical and vaginal epi-

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thelium was obtained with the Papanicolaou stain technique. Therefore, it was decided that the Papanicolaou method was the technique to be used in the remainder of the study.

Schiller's iodine tinctorial test of the cervix was used in the first 500 cases of the series and no correlation of this test and malignant areas of the cervix was found. This procedure was discontinued in the remainder of this project.

FINDINGS AND RESULTS

To date, 1,500 smears have been studied and of these 29 showed cytologic evidence of carcinoma of the cervix. Twenty-two were confirmed by biopsy, and in 7 biopsy of the cervix was negative. Thus the percentage of confirmed positive reports was 1.5 percent and the percentage of false positive reports was 0.47 percent. Meigs et al. (*5*) reported a series of 1,015 cases, with carcinoma found in 154 cases and a false positive report of 8.1 percent. Kano (*6*) reported a series of 500 cases with 1.6 percent false positives. Kernodle et al. (*7*) reported 1,709 cases in which cancer was found in 124 and a false positive report of 8.1 percent. Thus the results at this hospital compare favorably with those reported in the literature. It must be pointed out, however, that in our series the 7 false positive cases were reported in the first 250 cases examined indicating that with increasing experience in interpretation of smears, the number of errors became smaller. The number of false negatives cannot be determined unless a specimen for biopsy is taken on all patients. It is evident that such a procedure in a large series is not feasible. No attempt to select patients was made; all patients that presented themselves at the outpatient department were given a "cancer" test.

Definitive therapy is dependent upon whether the cervical lesion is preinvasive or invasive carcinoma. This is determined by obtaining a 360° cone of the cervix by sharp dissection. The specimen is serially sectioned and the ecto-endocervical junction is especially examined since this is the critical area as the nidus of malignancy according to Foote and Stewart (*8*) and Pund and Auerbach (*9*). If the cone reveals the neoplasm to be preinvasive, a simple hysterectomy with resection of a wide vaginal cuff is done. The distal 2.5 cm. of the cervix uteri is serially sectioned to rule out invasive carcinoma. On the other hand, if the initial cervical cone reveals invasive carcinoma, radium and high-voltage roentgen therapy is instituted as outlined by Baker (*10*).

Smears of the cervix of patients being treated for invasive carcinoma are taken weekly to determine the radiosensitivity of the tumor. Radiation response can be made on histologic studies as reported by Frankl and Amreich (*11*), Arneson and Stewart (*12*),

Warren et al. (*13*), and Graham (*14*). If malignant cells are still being desquamated after 90 days, a specimen is taken and if the smear findings are confirmed, a modified Wertheim procedure is considered, if the lesion is operable. However, if there are no malignant cells seen on the smear after 90 days following radium and high-voltage roentgen therapy, follow-up smears are done every 3 months. In 7 patients who had total hysterectomy, examination showed preinvasive carcinoma in 4 and no evidence of cancer in 3. In the latter, complete removal of the malignant tissue was obtained by a 360-degree conization of the cervix. In this series, there were 18 with squamous cell carcinoma and 1 with adenocarcinoma of the cervix. There were no instances of endometrial carcinoma; this is not unusual when it is considered that 97 percent of the patients seen at this clinic are of premenopausal age. The average age of patients with cancer of the cervix is found in this series to be 32.3 (fig. 1). Pund and Auerbach (*9*) report 36.6 years as the average age for "in situ" carcinoma in their series. Te Linde (*15*) reports the average age in his series to be 37.1 years. It is seen, therefore, that many interesting problems are posed as to the actual incidence of malignancy of the cervix in the otherwise clinically benign-appearing cervix. In 93 percent of the patients in this series no clinical manifestation of any malignant change in the cervix was apparent.

A side light of additional value of the Papanicolaou stain was in deciding on the type of cancer in a patient with anaplastic carcinoma

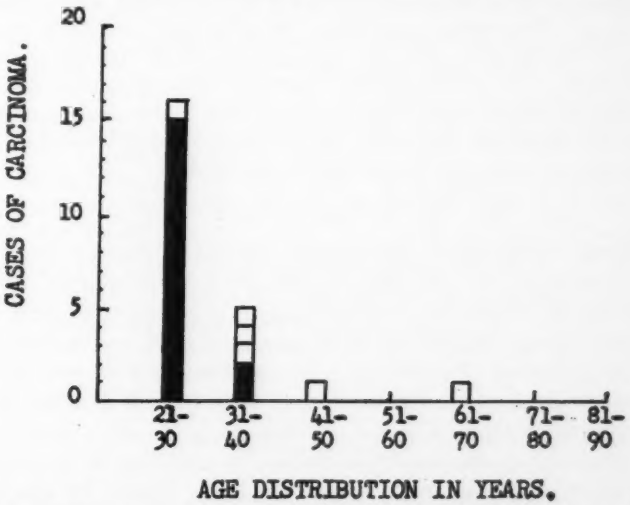

Figure 1.—White area represents the number of cases of invasive carcinoma; black area represents preinvasive carcinoma.

of the uterus. In this instance even after biopsy it was difficult to determine whether it was anaplastic adenocarcinoma or a squamous cell carcinoma. However, the cervical smear revealed cells with a definite keratinized cytoplasm indicating that the tumor was an anaplastic squamous cell carcinoma.

COMMENT

Sufficient data have been accumulated to indicate the value of the Papanicolaou-Traut cervical smear technique in determining when a specimen should be removed for biopsy. It should be emphasized that the smear is to be used only as an adjunct in establishing a diagnosis of cancer and that a diagnosis of carcinoma must be made only after biopsy. It is true that in some cases, the smear is quite specific in establishing a diagnosis of malignancy, still the source of error in borderline cases makes it imperative that biopsy be done. On the other hand, there were four cases in this series in which smears were positive for evidence of cancer and were negative on biopsy of three consecutive "around-the-clock" specimens. Finally, when a 360-degree conization of the cervix was done, the carcinoma was found. The value of smear screening methods cannot be overemphasized.

The importance of early diagnosis cannot be overemphasized. Cullen (*16*) in 1921 stated: "It is to the early diagnosis of cancer of the cervix that we must look for future success." At this hospital during the 6-year period from 1942 through 1948, a total of 44 cases of squamous cell carcinoma of the cervix were reported with 4 cases of in situ or preinvasive carcinoma. In contrast, during the 9-month period from October 1948 through June 1949, 27 cases of squamous cell carcinoma were detected by smear technique and proved by biopsy. Of these, 22 cases were preinvasive and 5 cases were invasive carcinoma. Statistics emphasize the value of the Papanicolaou-Traut method for the early detection of carcinoma of the cervix uteri.

CONCLUSIONS

The cervical smear technique as introduced by Papanicolaou-Traut is of definite value in the diagnosis of early carcinoma of the cervix.

Biopsy of "around-the-clock" specimens of the cervix is not the final procedure in the detection of malignancy. A more accurate method is the serial section of a 360-degree conization of the cervix. In some instances this removes all histologically demonstrable carcinoma.

Cytologic studies are valuable in following radiation response and determining radiosensitivity of the malignant lesion of the cervix.

The Papanicolaou-Traut smear technique should be adopted in properly staffed hospitals as a screening method for the detection of carcinoma of the uterus.

Cytologic study of a smear of the cervix for detection of malignancy should be done on all women at least once a year.

Schiller's tinctorial test of the cervix is valueless in localizing areas of early cancer of the cervix.

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Combination Porcelain and Acrylic Jacket

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SEVERAL types of jacket crowns are being made today and all of them are useful in crown and bridge prostheses. One that is an excellent replacement for single anterior teeth when an acrylic jacket might be inadequate is being made in some dental laboratories. A crown that will meet the standards of good prosthetic dentistry can be made with a combination of porcelain and acrylic.

A porcelain jacket crown preparation with a definite shoulder at the gingival periphery is made on the tooth to be treated. An impression is taken and an amalgam die is made. Both arches are duplicated in stone and articulated with the amalgam die in its correct positional relationship. A platinum matrix 0.001 inch in thickness is burnished to the amalgam die in the same manner as for a porcelain jacket. The entire matrix is covered with about 0.5 mm. of dampened porcelain of the same shade as that of the acrylic to be used. The encapsulated matrix with damp porcelain is allowed to dry and is then placed in the porcelain furnace and given a low biscuit bake. The time and temperature of these porcelain bakes are governed by the type of material used. The semi-baked porcelain is removed from the furnace and porcelain is added, especially to the shoulder area, to make up for the shrinkage that has occurred. It is then placed in the furnace and given a high biscuit bake. If an over-glaze occurs it can be removed with carborundum disks or stones. A roughened surface will be more adherent to acrylic material when the matrix is processed with porcelain.

An anatomic crown can be waxed to this porcelain core, although a manufactured acrylic tooth (Stock No. 5–600–250) is preferred. When a manufactured acrylic tooth is used, it is cut in half labiolingually and adapted to the labial surface of the porcelain core. Care in checking the bite and contact areas is necessary at this stage. After it is well adapted to the porcelain core, the lingual surface is waxed to the anatomic lingual form for the tooth to be treated. The entire crown is removed from the die and is then ready for processing. The

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jacket crown is invested in stone with the lingual waxed surface exposed to the upper half of the flask. After the wax has been removed by boiling water, the required shade of acrylic is packed onto the tooth and the porcelain-acrylic jacket is cured by conventional standards for curing methyl methacrylates. The most important step here is to cool the flask to room temperature *slowly* before deflasking. Rapid cooling by plunging in cold water will fracture the porcelain core. By carefully removing the crown and trimming judiciously little finishing is necessary (figs. 1 and 2). A brilliant gloss is not required as fluids in the patient's mouth will give a natural appearance to the crown. Sometimes a second matrix of mesh platinum is plated over the initial

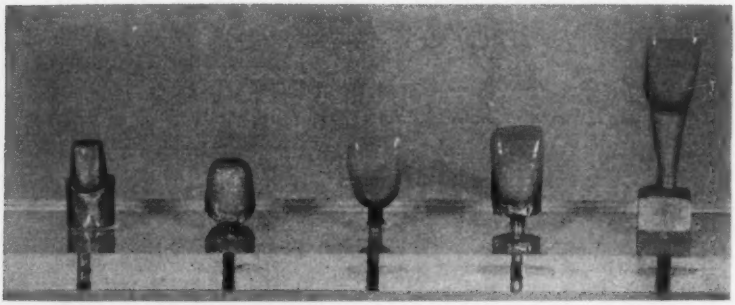

Figure 1.—Front view from left to right: Amalgam die, porcelain core, acrylic facing, waxed-up combination, finished jacket.

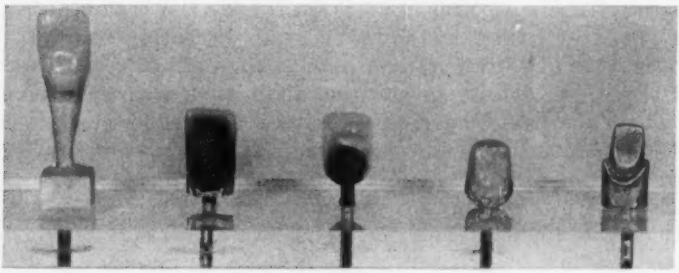

Figure 2.—Rear view from left to right: Finished crown, lingual waxed surface, acrylic facing, porcelain core, amalgam die.

matrix of platinum and the porcelain is baked onto it. This provides added strength but is not essential to the technique.

This combination jacket is especially valuable in that it (*a*) can absorb great stress because of the external layer of acrylic, (*b*) has an excellent watertight gingival seal, (*c*) unites with most cementing mediums, (*d*) can be altered externally, and (*e*) is excellent for the average shell crown.

Malacoplakia of the Urinary Bladder

Report of a Case

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MALACOPLAKIA is a rare lesion of the urinary bladder first described by Michaelis and Gutmann in 1903, and later named by von Hansemann in 1906 (*1*). In 1913, McDonald and Sewell (*2*) reviewed 21 previously reported cases and described 1 case of their own. In their case, lesions were found in the urinary bladder and both kidneys at autopsy. Only occasional cases have been reported since then, bringing the total to approximately 50.

CASE REPORT

Mrs. W., age 25 years, was first seen in the out-patient clinic in October 1947. At that time she was in the fourth month of her second pregnancy. She complained of gross, painless, intermittent hematuria. There was a history of three previous episodes of gross hematuria that occurred in 1944, 1945, and 1946. (In 1946 she was in the seventh month of her first pregnancy.) The hematuria lasted less than 1 week and each attack of bleeding was associated with urinary tract infection.

On admission in October 1947 the physical examination was essentially negative except for the urinary tract. On cystoscopic examination the bladder appeared normal, but blood issued from the right ureteral orifice. The urine contained numerous red and white blood cells. Urograms revealed a bizarre architecture of the calyces bilaterally, a possible filling defect on the right side, and a 1.5 cm. renal calculus on the left. The urinary tract infection and a moderate anemia, which had developed secondarily to the ureteral bleeding, responded to routine therapy, and she was discharged, symptomatically relieved.

She was readmitted 3 months later, having had hematuria daily since her discharge from the hospital. The findings were similar to those of the first admission. Routine symptomatic treatment was again given, and arrangements were made to terminate the pregnancy as soon as possible and still obtain a viable infant. In February 1948, during the eighth month of pregnancy, a living infant was delivered by cesarean section. The hematuria subsided and the patient made an uneventful recovery.

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In April 1948, she was treated for a left pyelonephritis. Hematuria had been present for 4 days. The symptoms and hematuria then subsided for a period of 11 months. A calycectomy was performed with removal of a calculus from the left kidney.

Hematuria returned for the seventh time in February 1949, and she was readmitted for further study. Significant physical findings were weakness and pallor and a 2-month uterine pregnancy. Laboratory findings: The red blood cell count was 3,700,000; hemoglobin, 10 gm. (69 percent). The urine contained numerous red blood cells; no organisms were noted on smear.

On cystoscopic examination bloody urine was noted. The bladder mucosa showed generalized inflammation and bullous edema at the vesical neck. There were two solid, yellowish-brown, moundlike elevations of the bladder mucosa, each measuring 0.5 cm. in diameter; one was located anteriorly and laterally to the right ureteral orifice, the other behind the trigone and medial to the right orifice. Blood issued from the right ureteral orifice. Urograms were essentially unchanged from previous studies. PPD tuberculin tests were negative.

Biopsy of a specimen of one of the bladder lesions showed granulation tissue and large numbers of macrophages containing laminated spherical, basophilic bodies pathognomonic of malacoplakia. There was infiltration by moderate numbers of plasma cells, a few lymphocytes, and occasional polymorphonuclear leukocytes. Interstitial tissue was scanty except for a rare fibroblast and a few capillaries. The overlying epithelium was denuded. Biopsy of a second specimen showed essentially the same findings. In addition, however, there was squamous metaplasia of the overlying bladder epithelium. Acid-fast stains were negative for *Mycobacterium tuberculosis*. Attempts to find the basophilic bodies in the urinary sediment from the right ureter and from the bladder were unsuccessful.

The patient received five blood transfusions, but continued to bleed. Because of the apparent correlation of the hematuria with pregnancy and also because of the refractory anemia, a therapeutic abortion was recommended and accepted by the patient.

Hematuria continued following this procedure. A phenolsulfonphthalein test, done 8 days postoperatively during cystoscopy, showed the following: The right kidney excreted 10 cc. of urine in 10 minutes with 17 percent total dye concentration; the left kidney, 12 cc. in 10 minutes with 7.5 percent total concentration. The appearance time was 3 minutes from each side.

The right renal pelvis was lavaged with 5 cc. of 1 percent silver nitrate solution. Twelve days after the abortion and four days following treatment with silver nitrate, the urine became grossly clear.

Since the patient's discharge from this hospital, she has had one recurrence of hematuria.

DISCUSSION

Etiology.—Many authors of earlier articles concerning malacoplakia attempted to indict *Mycobacterium tuberculosis* as the etiologic agent, inasmuch as in many of their cases pulmonary tuberculosis was found at autopsy. However, the presence of *Myco. tuberculosis* in the lesions was never demonstrated.

Many of the cases reported were associated with an *Escherichia coli* infection of the urinary tract, but again no one has proved a definite etiologic relationship between this organism and malacoplakia.

Rudnick and Ragins (*3*) reported a case of malacoplakia of the bladder occurring in the presence of severe urinary tract infection associated with unilateral nephrolithiasis. Upon removal of the diseased kidney, the infection and malacoplakia regressed spontaneously. Urine cultures revealed *Proteus vulgaris*, *Esch. coli*, *Staphylococcus albus*, and *Klebsiella pneumoniae*.

Cases have also been recorded in which hematuria was the only symptom.

The occurrence of malacoplakia in such a variety of circumstances suggests that it is a response to nonspecific irritation of the urinary bladder. If such is the case, malacoplakia probably is often not recognized.

Redewill (*1*) reported a case of malacoplakia in a patient with concurrent lesions of Boeck's sarcoid. He believed that the pathologic findings in both conditions were strikingly similar and concluded that malacoplakia is the manifestation of sarcoid in the urinary bladder. We believe that this is an erroneous assumption. Histologically, the lesions of Boeck's sarcoid are composed of small tuberclelike structures composed of whorls of epithelioid cells with Langhans-type giant cells. Occasionally these giant cells contain an intracytoplasmic inclusion body of calcific material and asteroid bodies. This calcific inclusion body is coarsely laminated, deeply basophilic and irregular in outline, roughly spherical, and has been named the Schaumann-Boeck body. The main cellular constituents of lesions of malacoplakia, although resembling epithelioid cells as described by some authors, are macrophages and are not arranged in tubercle fashion. Also, when multinucleated cells exist, they do not assume the appearance of the Langhans giant cell. The intracytoplasmic bodies diagnostic of malacoplakia are highly characteristic, and differ morphologically from the Schaumann-Boeck body and the asteroid body.

Pathology.—As described by most writers, the lesions of malacoplakia grossly are soft, small, rounded nodules, usually only a few millimeters in diameter and slightly elevated above the surrounding mucosa. They vary from pale yellow to gray, frequently have a slightly umbilicated pale center, and are often surrounded by a hyperemic halo. There may be only a few such nodules or they may be quite numerous. Occasionally, several small lesions coalesce to form a single large yellowish-white plaque which may be several centimeters in diameter (*6*). The most common sites are the posterior wall, the

region of the trigone, and about the ureteral orifices. Morison (*4*) reported a case in which a large nodule caused obstruction at the vesical neck. The lesions have also been found in the ureters (*4*) and in the kidneys (*2*).

The microscopic features are diagnostic and consist of varying numbers of highly refractile, homogeneous or laminated, spherical, basophilic bodies, the so-called Michaelis-Gutmann bodies (figs. 1 and 2). In our case these were numerous and varied considerably in size, some of the larger measuring 12 to 15 microns in diameter, the smaller 2 to 3 microns. Occasionally budlike forms have been reported. Their presence has led several observers to conclude erroneously that they are fungi. Apparently, their main constituent is calcium although small quantities of iron are also present (*3*). For this reason they have also been called calcospherites. They are usually present, singly or in pairs, intracellularly, although a few are apparently extracellular (*2*). In contradistinction to the Schaumann-Boeck bodies the calcospherites are finely laminated, moderately basophilic, smooth of outline, and perfectly spherical. Also, asteroid bodies, which are rather frequent in lesions of sarcoid, are not found in malacoplakia.

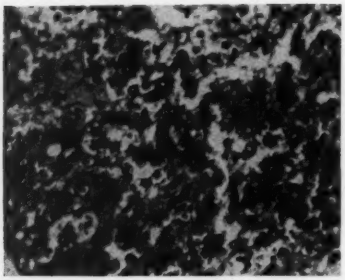

Figure 1.—Michaelis-Gutmann bodies within macrophages. Plasma cell infiltrate.

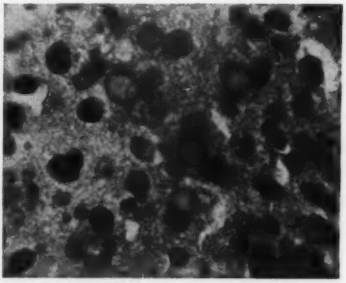

Figure 2.—High-power view showing detail of Michaelis-Gutmann bodies.

In most reported cases the macrophages which contain the calcospherites are the predominant cell type in the lesion. They are quite large, round, oval, or polygonal. Their cytoplasm is pale, eosinophilic, homogeneous, or finely granular. The nuclei may be vesicular, but are usually hyperchromic and somewhat irregular.

In areas where the macrophages are most numerous there is a scanty stroma of reticulum fibers which separates the cells into small islands (*3*). At the periphery of the nodules numerous fibroblasts are usually present together with an increase in the amount of stroma. Peripherally and at the bases of the lesions are usually numerous endothelial-lined, thin-walled, blood channels.

Symptoms referable to urinary tract infection have been prominent in the majority of patients. Occasionally asymptomatic gross hematuria has been the chief complaint (*1*) (*5*), as it was in our case.

Malacoplakia occurs most frequently in women of middle age or older; however, several cases have occurred in younger persons. Morison (*4*) reported a case in a 6-year-old girl; Oppermann (*7*) reported a case in an 8-year-old girl and referred to a case in a 9-year-old girl, previously reported by Fraenkel.

TREATMENT

Because of the infrequent recognition of the disease process no standardized treatment has been formulated. The lesions have responded to local fulguration in most cases. In Redewill's (*1*) case the patient's hematuria subsided upon irrigation of the renal pelves with weak silver nitrate solution. Again, another case spontaneously regressed merely upon removal of a source of infection in one of the kidneys (*3*).

SUMMARY

A case of malacoplakia of the urinary bladder is reported in a 25-year-old white woman whose principal symptom was intermittent, painless, gross hematuria, usually associated with urinary tract infection.

Although hematuria occurred between pregnancies, it became more profuse and constant during pregnancy. This is an interesting but unexplained feature of this case.

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Circumcision in the Adult

JUDSON A. MILLSPAUGH, *Commander (MC) U. S. N.*[1]

DURING the past 3 years more than 350 circumcisions were performed on the urologic service at the United States Naval Hospital, Pensacola, Fla. The ages of the patients varied from early childhood to the fifth decade, but the majority were in their twenties. More than 150 of them had early syphilis. Circumcision was done usually on the third day of penicillin treatment for syphilis, at which time the darkfield examination is invariably negative for *Treponema pallidum*. Healing was uneventful and the patients were ready for discharge upon completion of standard treatment—7½ days (6 million units of penicillin) in seronegative patients, and 10 days (8 million units of penicillin) in seropositive patients. Incidentally, among the last 400 patients admitted for syphilis, only 5 had been circumcised. Circumcision was done in three patients in whom a clinical diagnosis of syphilis was postulated but the diagnosis was not confirmed by repeated darkfield examinations and serologic tests. However, histologic examination of the excised prepuce was consistent with a diagnosis of syphilis in two and the third showed nonspecific chronic inflammation. Subsequent follow-up revealed a strong seropositive reaction in the first two patients; the third had a seronegative reaction. Penicillin treatment was only initiated following laboratory confirmation. The circumcisions healed by primary intention in all three patients.

Since over 150 circumcisions of patients with early syphilis have healed primarily, we conclude that early syphilis under treatment with penicillin is no contraindication to simple elective operation, and that circumcision serves several useful purposes: (*a*) Hygiene is improved for the patient; (*b*) increased resistance to syphilitic reinfection and malignancy are enhanced; (*c*) no additional time is lost in hospitalization; and (*d*) the operation is good teaching material for interns, all of whom should have experience in this simple, valuable operation which, in many cases, is definitely indicated, particularly in the military service.

[1] U. S. Naval Hospital, Pensacola, Fla.

TECHNIQUE

Preoperative preparation.—The patient takes a thorough cleansing bath or shower and shaves the pubic area. Demerol, 100 mg., or morphine, ¼ grain, and atropine, 1/150 grain, by hypodermic; and phenobarbital, 1½ grains, by mouth are given 30 to 60 minutes before operation. The abdomen, the upper- and mid-thighs, and the entire penis and scrotum are prepared with tincture of merthiolate.

Anesthesia.—A 2-percent aqueous solution of procaine is injected subcutaneously about the base of the penis. Seldom is more than one needle puncture or more than 30 cc. procaine necessary. Several additional drops are injected beneath the penile frenum. A few minutes' wait and gently rolling the injected areas between the operator's thumb and fingers seems to hasten the effectiveness of the anesthetic. Adrenalin is not added to the anesthetic solution.

Operation.—A firm bite is taken at the middorsal and midventral prepuce with an Allis forceps (or hemostat). Firm traction is made upward and dorsally and ventrally with each respective Allis. A straight 9-inch hysterectomy forceps (Péan) is applied at an oblique slant including more prepuce dorsally (fig. 1). The hysterectomy forceps are turned to the right and left while the glans penis is carefully palpated beneath by the fingers and thumb. With a Bard-Parker scalpel hugging the undersurface of the hysterectomy forceps the prepuce is severed with one quick stroke, leaving a smooth edge of tissue for suture. An alternate procedure is to use the electrosurgical knife. With this method there is practically no hemorrhage. (However, in one patient a moderately severe second-degree burn of the glans occurred because of heat transmission—the current used was insufficient to sever the tissue quickly.) The edges of the prepuce are retracted and all bleeding points are either tied or coagulated with the electrosurgical current. A suture is first introduced from the raphe to the frenum ventrally; a similar suture is placed dorsally. Then sutures are placed equidistant between these. Occasionally these four sutures are sufficient. Often intermediate sutures are added, particularly on the ventral edge, so that there is perfect and complete

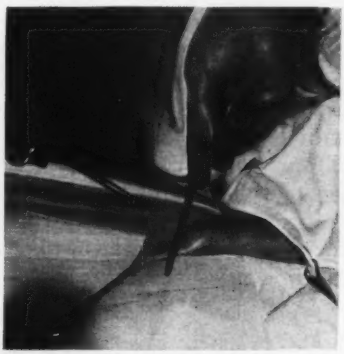

Figure 1.—Traction on prepuce and position of hysterectomy forceps is illustrated.

apposition of tissue circumferentially. Plain No. 00 catgut sutures are used; they hold for several days and do not require removal.

The wound is lightly sprayed with sulfadiazine powder. A sterile petroleum jelly gauze strip is applied to the suture line. A sterile dry 4- by 4-inch gauze pad folded lengthwise and secured by a tape or a small rubber band completes the dressing.

Redressings are done as indicated by soilage; some not for 5 to 7 days, when healing is complete. Patients are returned to bed ambulatory or by wheel chair. Routine postoperative orders include: catheterization every 8 hours if necessary (rarely required, only once thus far in our experience); codeine and aspirin every 3 or 4 hours as necessary for 48 hours; nembutal, 1½ gr. at bedtime for 3 consecutive nights; the patient is instructed to sleep on the side rather than on the back (fewer erections occur); and to use an ice bag intermittently, if desired, particularly to inhibit erection; when erection occurs, stir about, wash face and hands in cold water; and the patient is instructed to summon assistance and call attention to any unusual bleeding.

Ainhum

Report of a Case With Bilateral Involvement

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AINHUM or dactylolysis spontanea is a disease of unknown cause characterized by a progressive constricting fibrous band at the base of one of the digits, usually the little toe, with eventual spontaneous amputation of the involved digit. It is confined almost entirely to the Negro race, is uncommon in the United States, but it is frequently encountered in tropical countries. As a rule, only one toe is involved. The fingers are rarely affected.

The disease begins with the formation of a transverse groove in the skin on the flexor surface of the toe at the digitoplantar fold. The groove deepens and spreads circumferentially until the toe is completely surrounded by a narrow fibrous band.

The distal segment becomes enlarged, soft, and bulbous, and atrophy of the nail occurs. Pain is usually absent; however, ulceration may supervene with developing gangrene and pain. There is resorption of the underlying bone until the toe is attached only by a fibrous cord (*4*) (*6*) (*9*) (*13*) (*14*). Spontaneous amputation occurs several years after the initial lesion.

Microscopically there is hyperkeratosis, scar tissue formation, and low-grade chronic inflammation. Many of the vessels exhibit an endarteritis, although the significance of this finding has been previously overemphasized (*5*). The underlying corium is thin and merges with the periosteum so that each can barely be differentiated. A rarefying osteitis is found in the involved bone.

Ainhum has been considered by various authorities as a distinct pathologic entity and by others as a manifestation of a more generalized condition. It has been found in several nonlocalized diseases of the skin. Hyde and Montgomery (*19*) and Spencer (*7*) observed it in conjunction with palmar and plantar keratoses. Stelwagon (*17*) found it associated with pityriasis rubra pilaris. It has also been reported in patients having ichthyosis, scleroderma, and keratodermia.

[1] U. S. Naval Hospital, Charleston, S. C.

Gross (*15*) believed his case was due to trauma and trophoneurosis. Martens and Norris (*5*) suggested chronic osteomyelitis as the essential lesion and that the fibrous constriction is the result rather than the cause of bone destruction. Spinzig (*9*) noted that of the cases reported in the United States up to 1939, 8 had corns or calluses at the point of constriction. The lesion has been attributed to trauma, leprosy, bacterial and fungus infections, parasitic infestations, trophoneurosis, wearing of constricting bands, scleroderma, syphilis, vascular disorders and others (*2*) (*3*) (*7*) (*8*) (*10*) (*11*) (*12*). Most of these theories have been discarded. It is Spinzig's (*9*) and Sutton's (*10*) contention that the term "ainhum" should be applicable only when the specific lesion of the toe occurs alone and not be considered a manifestation occurring in association with other diseases. The definite fibroplastic tendency of the Negro race is probably the principal predisposing factor.

Ainhum was first described in 1860 by Clark (*22*) who observed this condition among the natives of the African Gold Coast and reported it as dry gangrene (*18*). Da Silva Lima (*21*) of Brazil gave the earliest complete accounts of the disorder in 1880. The first case in the United States was reported from North Carolina by Hornaday (*20*) in 1881. Up to 1948 there have been 54 cases reported in the United States (*1*).

CASE REPORT

R. G., a 57-year-old Negro was admitted to the U. S. Naval Hospital, Charleston, S. C., in May 1949, complaining of pain in the right little toe. About 4 years previously he had noted a numb feeling along the lateral aspect of the right foot. This numbness persisted for approximately 1 year, then disappeared.

Three years prior to admission he noticed a "cutting feeling" in the right fifth toe, but could not detect any gross abnormality. There was also intermittent swelling of the distal portion of this toe, together with occasional swelling of the lateral aspect of the right foot.

About 1 year ago the patient noticed a furrow at the base of the right little toe as though "something was tied around the toe." This furrow had become progressively deeper. Pain likewise became more severe until he could wear only soft canvas shoes.

On the opposite foot a similar change was taking place. Approximately 6 months prior to admission he noted a "stinging" in the fifth toe. At the time of admission a persistent stinging pain was present in the left little toe but it was not severe enough to inhibit walking or wearing the usual type of leather shoe.

There was no history of injury or trauma to either foot.

The past and family histories were noncontributory.

Physical examination.—The skin over both ankles and lower legs was dry and thickened. Both posterior tibial and dorsalis pedis pulses were palpable. At the digitoplantar fold of the right and left little toes was a firm annular constricting band of scar tissue (fig. 1). On the medial and plantar surface of

Figure 1.—Appearance of feet on admission.

each fifth toe was a deep furrow, the one on the right being deeper than the one on the opposite toe. Distal to the constricting bands both toes were bulbous, edematous, and tender to palpation. The nails were soft and atrophic.

The area of the constricting band on the right toe was acutely inflamed and he had severe pain when the toe was moved. After the infection had subsided, the pain on motion subsided although the toe remained tender to pressure. Sensation over the remainder of both feet was entirely normal.

Laboratory examination.—White and red blood cell counts, hemoglobin, and sedimentation rate were normal. The blood Kahn test was negative. Serum inorganic phosphorus, 2.0 mg. per 100 cc.; blood calcium, alkaline phosphatase, fasting blood sugar, nonprotein nitrogen, and blood uric acid were normal. Stools were negative for ova and parasites. An electrocardiogram revealed a residual posterior infarction with no evidence of recent activity. Roentgenograms revealed soft tissue contraction at the bases of both little toes. The proximal phalanx of the right small toe was considerably narrowed except for the proximal end. The distal head was very small with a notch on its lateral side. The outline of the phalanx was smooth. The shaft of the left proximal phalanx was slightly narrowed but showed no erosion. No abnormalities were present in other bones.

Treatment.—The right toe was amputated at the metacarpophalangeal junction, while the constricting band on the left was incised transversely. The postoperative course was uneventful.

Examination of surgical specimen.—Gross examination of the surgical specimen revealed a hard constricting fibrous band at the base of the toe that ex-

tended to the underlying bone. The phalanx was narrow, irregular, and measured 0.3 cm. at its smallest diameter.

On microscopic examination a nonspecific fibrosis was observed. At the constricting band the epidermis was thin and showed a complete loss of rete pegs. Hyperkeratosis and parakeratosis were distinct at the site of constriction, although on either side of the band there was absence of parakeratosis. The underlying corium consisted of dense collagenous connective tissue that merged into the periosteum and contained a few diffusely scattered lymphocytes. Rete pegs, sudoriferous glands, and accumulations of lymphocytes were prevalent on either side of the constricted area. In the area of scar tissue formation only capillaries were visible. Some of the adjacent arterioles showed slight endarteritis but the majority appeared normal. The underlying phalanx was irregular and showed osteolytic changes with partial replacement by collagenous tissue. Fat cells filled the trabecular spaces. No inflammatory reaction involving the phalanx could be demonstrated.

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Treatment of Herpes Zoster With Protamide

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THE usual clinical course of herpes zoster is that of preceding hyperesthesia, itching, or pain, followed by the appearance of tense, grouped vesicles on an erythematous base along the course of the affected nerve. Within 48 hours, the lymph nodes in the vicinity are usually enlarged and tender; a point of importance in differential diagnosis.

Ormsby and Montgomery (*1*) state that the average duration of the disease is from 10 days to 3 weeks, that the pain varies in intensity and duration, that many younger patients experience no discomfort, and that, in children, itching is apt to replace pain.

Treatment for the pain and discomfort varies; over 20 systemic and local measures are suggested by Ormsby and Montgomery. A recent article by Binder and Stubbs (*2*) indicates that aureomycin may be effective.

Costello (*3*) found that protamide was effective in the relief of the posterior root pain of tabes dorsalis and it has been recommended for use in controlling the pain of herpes zoster.

Protamide is a colloidal solution of a processed and denatured proteolytic enzyme obtained from the glandular layer of fresh hog stomach by controlled pepsin reactions in water baths (*3*) (*4*).

No controls were in our study as thousands of intramuscular injections of other drugs given to patients with herpes zoster in the past, with no appreciable benefit, would adequately serve as a control.

Pain, not merely the discomfort or itching, was the indication for treatment. Protamide (1.3 cc., the contents of one ampule) was given daily intramuscularly. No other local or systemic medications were given. The results of our study are tabulated in table 1.

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TABLE 1.—*Results*

Case No.	Sex	Age	Distribution	Pain at onset of treatment	Duration of disease prior to onset of treatment (days)	Number injections of protamide	Results	Observations
1	F	28	L 1-2	Moderate	6	4	Pain gone in 48 hours. Vesicles cleared in 4 days	Large inguinal nodes remained tender 4 days.
2	M	31	L 1-2	Severe	5	4	Pain completely relieved in 4 days	Previous therapy with pituitrin with failure.
3	M	21	T 7	Moderate	3	4	Pain gone in 72 hours	No new vesicles after first injection.
4	M	49	T 2-3	Severe	35	15	Poor relief of pain	Skin lesions rapidly regressed and healed. Treatment with acetylsalicylic acid and codeine prior to protamide without relief.
5	M	35	T 5	Moderate	7	7	Relief of pain after 4 days	Skin lesions flattened rapidly.
6	M	20	T 12–L 1	Severe	6	4	No pain after 72 hours	Inguinal gland tender for 48 hours.
7	M	20	T 6	Moderate	3	3	No pain after second injection	Skin lesions cleared rapidly.
8	M	36	T 5	Severe	5	4	Almost complete relief in 48 hours	Hemorrhagic bullae healed with only superficial scarring.
9	M	20	T 7-8	Moderate	6	4	Pain decreased greatly in 24 hours	None.
10	M	39	T 1-3	Severe	10	7	Six days of pain; then complete relief	Pain during first 2 days required use of morphine.
11	M	20	T 2-3	do	3	4	Cleared in 2 days	Temperature 100° F. and headache on admission. Both cleared in 48 hours.
12	F	62	T 7-8	do	10	22	Improved after 10 days. Pain gone in 22 days	Severe anemia. Severe osteoarthritis with disk degeneration at level of involvement.
13	F	42	T 5	Moderate	3	3	Rapid relief of pain	Vesicles flattened overnight.
14	F	24	L 1-2	do	10	4	No pain after 3 injections	Inguinal node tender for 6 days.
15	M	28	T 6-7	Mild	3	3	No pain after 2 injections	None.
16	M	23	T 5	Moderate	6	5	Pain persisted for 4 days, but cleared dramatically	None.
17	F	25	L 1-2	do	6	6	Pain cleared in 3 days	Skin lesions hemorrhagic. Protamide continued until they flattened completely.
18	M	27	T 7-8	do	4	3	Excellent results	None.
19	M	38	T 2-3	Severe	6	8	Pain improved after 3 injections and was gone after 6 injections.	Large, tender axillary nodes.
20	F	22	T 5	Moderate	2	3	Excellent results	None.
21	M	32	L 1-2	do	6	6	Pain present for first 5 days of treatment	None.
22	M	24	C 2-3	Severe	10	5	Pain eased within 48 hours	Case was treated outside as a contact dermatitis before being started on protamide.
23	F	26	T 5	Moderate	3	3	Excellent results	None.
24	M	22	T 6-7	do	8	4	Excellent results	None.
25	M	28	T 1-2	Severe	6	6	Pain relieved in 72 hours	Large axillary glands probably contributed to the severe pain.
26	M	31	T 5	Moderate	4	4	No pain after 2 days	None.
27	F	32	T 6-7	do	7	3	Pain relieved in 48 hours	None.
28	M	37	T 2-3	Severe	10	5	Good results with extensive involvement and severe pain.	Patient stated he had "shingles" before. Last time took 2 weeks to heal.
29	M	22	T 5	Moderate	4	4	Good results	None.
30	F	72	CN 5$_1$	Severe	10	8	Pain relieved in 10 days, gone in 23 days. No eye involvement. Extensive scarring.	Suspected gastrointestinal malignancy; chronic alcoholic; drug addiction.
31	F	22	C 2-3	Mild	5	3	Pain relieved in 3 days	None.

Thirty-one cases of herpes zoster were treated with protamide; good to excellent results were obtained in 28. In those failing to respond, other factors besides age of patient may have been involved. Case 4 had had pain for 5 weeks before treatment was begun. Case 12 had severe hypochromic anemia and extensive osteoarthritis with disk degeneration in the area involved. Case 30 was a chronic alcoholic, 72 years of age, and addicted to narcotics; gastrointestinal malignancy was suspected in her case. No reactions to protamide, either local or systemic, were noted. Routine urinalyses and blood counts were within normal limits in all cases, with the exception of case 12.

CONCLUSIONS

While this series of cases is small and clinical evaluation of the relief of pain in this disease difficult, it is believed that protamide is of definite value in the relief of pain in herpes zoster. Further, vesicles and crusts disappear much more rapidly than in untreated cases.

The relief of pain was superior to that obtained when using either pituitrin, thiamine chloride, autohemotherapy, sodium iodide, or high-voltage roentgen therapy.

The advantages of protamide are the simplicity and absence of pain in administration, lack of reactions, and its apparent safety.

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Practice Knot and Suture Board

OTTO L. CHURNEY, *Colonel, MC, U. S. A.*[1]

GOOD surgical technique depends, among other things, on manual dexterity with instruments and suture material. This in turn requires constant practice, both in and out of the operating room. Surgical interns have long been urged to practice making surgical stitches and tying knots, with any kind of available string, on pillows, blankets, chairs, and bedposts. Although this practice serves a useful purpose it is inconvenient and cumbersome. For this reason a practice knot and suture board was devised (fig. 1). It can easily be made in any medical supply repair shop. The base is of ¾-inch softwood, 3 to 4 inches wide, and 8 to 9 inches long. In the center is a sixpenny nail at an angle of 45° to the short axis of the

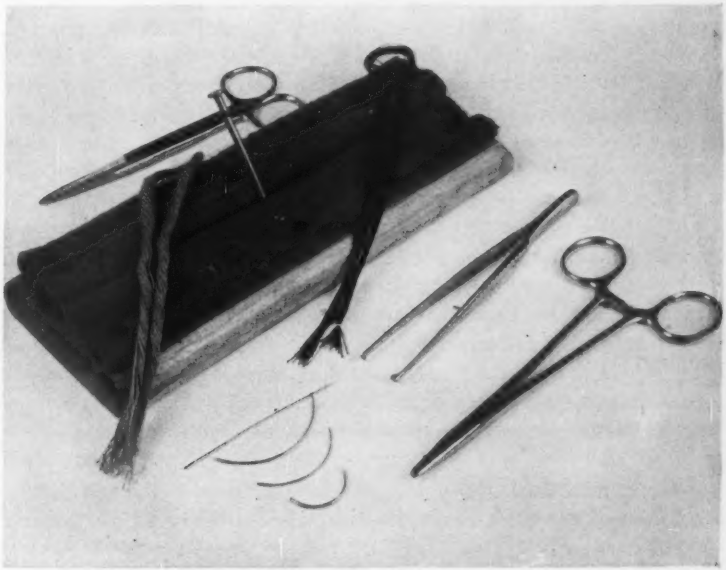

Figure 1.

[1] Murphy General Hospital, Waltham, Mass.

board. A small area of 1 to 3 millimeters near the middle of the nail is filed to a sharp edge. This nail represents a hemostat attached to a bleeder. The ligature can be released from the nail by cutting it on the sharp edge. Folded pieces of a salvaged blanket or similar material are tacked lengthwise on both sides of the nail. The inner edges can be used to simulate skin edges, and the fold, the intestines. They can be modified by representing the various intestinal coats with layers of different colored cloth.

Salvaged needles and hemostats are always available for practicing the technique of anastomosis and various types of stitches. All nonabsorbable suture material, not to be used at the operating table again, should be saved and put into a practice suture box in the officers' dressing room, thus making available actual suture materials for this use. By using this equipment a novice can quickly learn to tie square knots with ease and without moving the board. Familiarity with the tensile strengths of the various suture materials can be acquired also so that fewer sutures will be broken when operating. It will well repay any young surgeon to have such a board with sutures, needles, needle holder, forceps, and scissors so that he may practice suturing in his spare moments.

Profile of a Probation Violator[1]

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SAMUEL GERSTEIN, *Lieutenant Commander (MSC) U. S. N. R.*
EARL R. PETERS, *Lieutenant, junior grade (MC) U. S. N.*
THOMAS J. MATHIEU, *Lieutenant, junior grade (MC) U. S. N. R.*

MANY efforts have been made to screen possible neuropsychiatric casualties at the induction station by means of various psychiatric and psychologic methods of examination. Much less attention has been paid to the potential military offender, and yet any reliable method of detecting potential general court martial offenders and probation violators would no doubt result in a tremendous financial and man-hour saving to the Armed Forces in the administration of military law and confinement. Since the U. S. Naval Disciplinary Barracks, Portsmouth, N. H., houses approximately one-half of the offenders under sentence by naval general courts martial, an excellent opportunity presented itself for a study to establish some criteria for the identification of the potential military offender at the recruiting station, and provide criteria of benefit to those responsible for restoring confinees to duty. The following studies were made: (*a*) The personality and social background of the probation violator; (*b*) a comparison of these personality traits with those of duty personnel having no record of a general court martial; (*c*) a comparison of the probation violators and duty personnel with a third group—college freshmen—selected at random; and (*d*) a study of these data to determine the profile of the probation violator.

We use the term "probation violator" to refer to an individual who, having been sentenced by a general court martial and thereafter restored to duty on probation, fails one of the conditions of his probation and is returned for the completion of his sentence. A recidivist is defined as an offender who has repeatedly violated the regulations, and failed to profit from punishment.

For the purposes of this study, a special questionnaire was answered by 142 probation violators at present or recently confined at

[1] U. S. Naval Disciplinary Barracks, Portsmouth, N. H.

the disciplinary barracks. Through the cooperation of the department of psychology of the University of New Hampshire, the same data were collected from 206 students of comparable age, and from a third group of 205 duty personnel assigned to serve the disciplinary barracks. One hundred and forty-three of the students had been in some branch of the Armed Forces; 64 had been in either the Navy, the Merchant Marine, the Marine Corps, or the Coast Guard, and 79 in the Army or the Air Force. The question arises concerning the fairness and validity of considering the college students as a group for comparison because of their better socioeconomic background and higher educational achievement. Against this criticism, it is argued that the college students represent a group of comparable age—and in the case of those who saw military service, a group with somewhat comparable experience, who demonstrated their ability to adjust themselves adequately. Further, the students are presented not as a control group, but as a group exhibiting contrasting characteristics designed to accentuate the traits of the less well-adjusted probation violator. The original intention was to compare the probation violators with a control group of successful probationers but, unfortunately, this was not feasible.

The interview questionnaire contained 249 questions, principally of the objective type, which could be answered either by yes or no or by simple statements. The shortcomings in a questionnaire of this type are recognized; however, by the introduction of similar questions at various points, a cross-check which helps to establish the validity of the material elicited is possible. Although the probation violators and the duty personnel were told that they need not fill in questions they preferred not to answer, they were later encouraged, through the medium of the personal interviews, to supply the missing facts. During the quarantine period, each of the probation violators was interviewed by two or more members of the psychiatric department. Thus, it is believed that a considerable amount of reliable material was gathered from these groups for the purpose of comparison.

The questionnaire contained the following categories: (*a*) physical condition, (*b*) family history, (*c*) socioeconomic background, (*d*) marital history, (*e*) educational background, (*f*) self-evaluation, and (*g*) early neurotic traits. This article is concerned with those factors upon which the probation violator appeared to vary significantly from the other groups.

PHYSICAL CONDITION

Physical examinations of probation violators upon confinement, and all duty personnel showed them to be physically normal. The college

group were all examined upon entrance and it may, therefore, be assumed that they were physically normal. In spite of this fact, 13.7 percent of the probation violators, 12.1 percent of the college students, and 3.5 percent of the duty personnel believed that there was something physically wrong with them. Twenty and one-tenth percent of the probation violators said that they were considered to be nervous children, compared with 11.4 percent of the college students, and 12.8 percent of the duty personnel. Concerning unusual illnesses during childhood, serious accidents, and severe head injuries, there was no significant difference between the three groups. The mean age for the probation violators in this study was 24.4 years; for the college students, 22 years; and for the duty personnel, 21 years.

FAMILY HISTORY

More frequently than any other factors, the patterns and influences of the home environment figured among the possible causes not only for the violation of probation, but also for the primary offense. Family history, in this study, included only the immediate parents, or foster parents, siblings, grandparents, and close relatives, and the relationships existing between them and the subject.

When the three groups were compared, it was found that 21.2 percent of the probation violators' fathers were not living, and in 17.2 percent their mothers were not living, against 16.5 percent and 10.6 percent among college students, and only 8.3 percent and 9.6 percent respectively among the duty personnel. These percentages, however, should be considered with respect to the age of the individual when the death of the parent occurred because the total effect of the loss would necessarily be modified by this factor (table 1).

TABLE 1.—*Age at which home was broken by death of a parent*

Age interval	Probation violators		College students		Duty personnel	
	Number	Percent	Number	Percent	Number	Percent
Birth to 5 years	20	14.7	11	5.4	17	9.0
6 to 10 years	20	14.7	20	10.0	12	6.3
11 to 15 years	17	12.5	15	7.4	11	5.8
Total	57	41.9	46	22.8	40	21.1
16 to 18 years	6	4.4	3	1.4	5	2.6
19 years and over	12	8.8	15	7.4	5	2.6
Total	75		64		50	

Psychologically related to the element of parental death is the situation of parental separation, especially when a state of enmity existed between the parents, or when there had been desertion of one parent. Again, the probation violator ranked high as a victim of this situation,

22.6 percent having parents who were divorced or separated, against 8 percent for the college students. Among duty personnel the incidence was 20.6 percent.

Perhaps a more comprehensive picture of these factors can be obtained by combining them into the more inclusive broken home situation (table 2). The method of computing these figures was not that of numerical addition of the factors of parental death, separation, or divorce, but rather, of seeking the factor which was the earliest cause of the broken home. Those cases in which separation or divorce occurred prior to the death of one or both of the parents was considered only once in estimating the total (table 1). Similarly, when the death of one parent occurred prior to that of the other, it was considered that the home situation was broken by the first death. This method furnishes a figure of greater significance. It is considered highly important that 41.9 percent of all probation violators were victims of a broken home situation prior to age 16. Only 21.1 percent of the duty personnel and 22.8 percent of the college students had similar home conditions.

TABLE 2.—*Broken home situations (homes considered to have been broken by divorce, separation, or death of parents)*

Home situation	Probation violators		College students		Duty personnel	
	Number	Percent	Number	Percent	Number	Percent
Broken homes	81	57.5	69	33.5	67	33.1
Homes intact	60	42.5	137	66.5	135	66.9
Total	141	100.0	206	100.0	202	100.0

In 85 percent of the cases at this activity the offense was unauthorized absence and in these the excuse of illness at home recurred with unusual frequency. It is difficult to estimate the reliability of this excuse; nevertheless, if the condition exists, its importance to the man must be considered. At the time of the offense, 54.2 percent of the mothers and 52.2 percent of the fathers of probation violators were claimed to be in poor health. In contrast, only 12.1 percent of the mothers of college students, 17.5 percent of the mothers of duty personnel, 11.7 percent of the fathers of college students, and 11.3 percent of the fathers of duty personnel were in poor health.

Compatibility of parents of the probation violator did not differ significantly from that of parents of the duty personnel (18.5 percent of the parents of the probation violators were incompatible and 20.5 percent of the parents of duty personnel were incompatible); only 8.5 percent of the parents of the college students were incompatible, a figure to which some importance may be attached.

There appeared to be some correlation between the individual's ability to get along well with his parents and a pleasant home environment. The probation violators indicated that 11.1 percent did not get along with their parents, and 12 percent stated that it was not pleasant at home. The college students' responses indicated that 3.9 percent did not get along with their parents, as compared to 3 percent of the duty personnel. Six and five-tenths percent of the college students and 8.1 percent of the duty personnel came from unpleasant home situations.

Perhaps, because of the broken home situation or as a result of financial difficulties, 28.5 percent of the probation violators were reared by someone other than their parents. Ten percent of the college students and 15.1 percent of the duty personnel were reared under similar conditions.

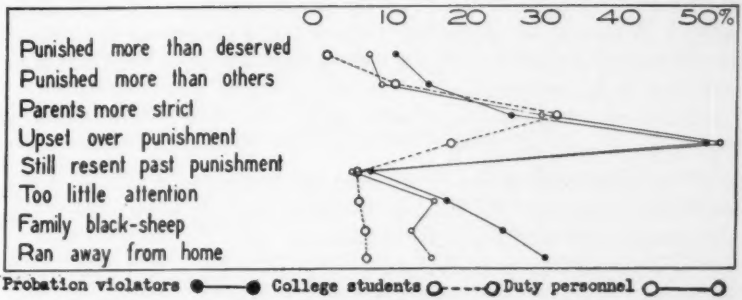

Figure 1.—Various aspects of punishment and resultant attitudes, illustrating attitudes engendered in the probation violators, college students, and duty personnel and resultant effects.

The various aspects of punishment and its administration have been treated together in figure 1. Almost twice as many probation violators and duty personnel received corporal punishment exclusively (64.2 percent and 63.1 percent), as did college students (33.3 percent). The college group consistently indicated a higher percentage of individuals in whose homes forms of punishment such as scolding and deprivation of privileges alone were used, or were combined with corporal punishment. An early tendency on the part of the probation violator to escape unsatisfactory situations through flight was evidenced by the fact that, prior to enlistment, 30.6 percent ran away from home. Various reasons were given for this action, but the excuses which recurred most frequently indicated a resentment of punishment and authority (table 3). Only 7.3 percent of the college students and 19.0 percent of the duty personnel said that they ran away from home prior to entering college or the service.

TABLE 3.—*Reasons given for running away from home*

Reason	Probation violators		College students		Duty personnel	
	Number	Percent	Number	Percent	Number	Percent
Adventure	9	25.7	4	26.7	13	48.2
Escape restrictions	10	28.5	4	26.7	5	18.5
Felt unwanted	0	0	0	0	3	11.1
Resentment	8	22.9	2	13.3	3	11.1
Others	8	22.9	5	33.3	3	11.1
Total	35	100.0	15	100.0	27	100.0

In many cases among the probation violators, not only a poor intrahome relationship was demonstrable, but also a nonconformist tendency among relatives. Since the extent of contact with those relatives having records of civilian offenses was not determined, the extent of influence cannot be demonstrated; nevertheless, the fact that some correlating factor exists should probably be accepted (*1*). Twenty-four and two-tenths of the probation violators, 11.3 percent of the college students, and 18 percent of the duty personnel listed relatives who had been in jail or prison.

SOCIOECONOMIC BACKGROUND

Under this heading were included: the individual's rating of the community, the family's financial condition, his past work record, and his conduct as reflected in civilian offenses.

It was not possible to demonstrate the generally accepted theory that delinquency and inadequacy are fostered by bad community or slum conditions. This is not unexpected because the military offender is seldom a criminal type. Two and one-tenth percent of the probation violators, 1 percent of the college group, and 3.6 percent of the duty personnel said that their section of the community was considered bad. This, however, was not corroborated by estimates of the family's financial status; 31.9 percent of the probation violators came from families whose financial condition was considered to be poor, against 15 percent for the college students, and 14.3 percent for the duty personnel. Paralleling this, the families of 35.1 percent of the probation violators, 10.8 percent of the college students, and 24 percent of the duty personnel were on relief at some time. The probation violator's family consistently moved more frequently than the families in either of the other two groups.

The matter of civilian delinquency among these groups showed several points of interest. As far as early tendencies to delinquency reflected in truancy were concerned, the differences were very slight; however, the difficulty of adjustment in later civilian and military life persisted in the probation violator, leading him to a greater number of

more serious offenses, while the college group, and, to a large extent, the duty personnel, were able to recognize mistaken attitudes and arrive at more adequate solutions to their problems (table 4). No college students admitted having been confined for more than 1 day; while 3 duty personnel admitted having been confined for as long as a week, and one was confined over a year. In contrast, 10 probation violators had been previously confined for a day, 10 for less than a week, 11 less than a month, 3 less than a year, and 6 for over 1 year.

TABLE 4.—*Civilian delinquency and confinement*

Delinquency	Probation violators		College students		Duty personnel	
	Number[1]	Percent	Number	Percent	Number	Percent
Played hookey	93	70.3	132	65.5	138	75.3
In reform school	9	8.6	0	0.0	8	8.0
Arrested	50	37.5	8	4.2	35	17.5
In jail	44	38.9	6	8.7	15	16.1
In civil prison	4	4.0	0	0.0	2	2.1
Vagrancy	8	6.0	3	1.5	4	2.1

[1] Because of overlapping of offenses, these figures exceed the tota number of cases.

The investigation of civilian occupations held prior to entry into the service was of debatable value. Probation violators showed a tendency to change jobs frequently. This is understandable because the nature of their conflict is such that in order for them to avoid acceptance of authority they constantly shift their positions and keep their attention fixed on the immediate gain rather than looking to ultimate success by buckling down to a difficult period of apprenticeship. Duty personnel demonstrated a middle-of-the-road tendency in their indication of an equal frequency of permanent and temporary jobs. Naturally, the college students consistently held temporary jobs.

Although facilities for recreation for the man in service and the civilian differ greatly, a variation of preference was observed. About 50 percent of the probation violators and the duty personnel preferred outdoor athletics while about one-third of them preferred a combination of outdoor and indoor activities. This demonstrates the tendency of the probation violator to work out his conflicts in action and to escape from his inner feelings of inadequacy into physical activity. The college group varied widely. Only 20 percent of them preferred outdoor athletics exclusively, while 75 percent preferred a combined form of leisure time activity.

Alcoholism, as a factor of escape and as a primary cause of many naval offenses, should not be underestimated. Of the civilian offenses admitted by the confinees, one-fourth were directly attributable to drinking and only a negligible number denied drinking. Twenty-two and four-tenths percent of the probation violators, 4.6 percent of the

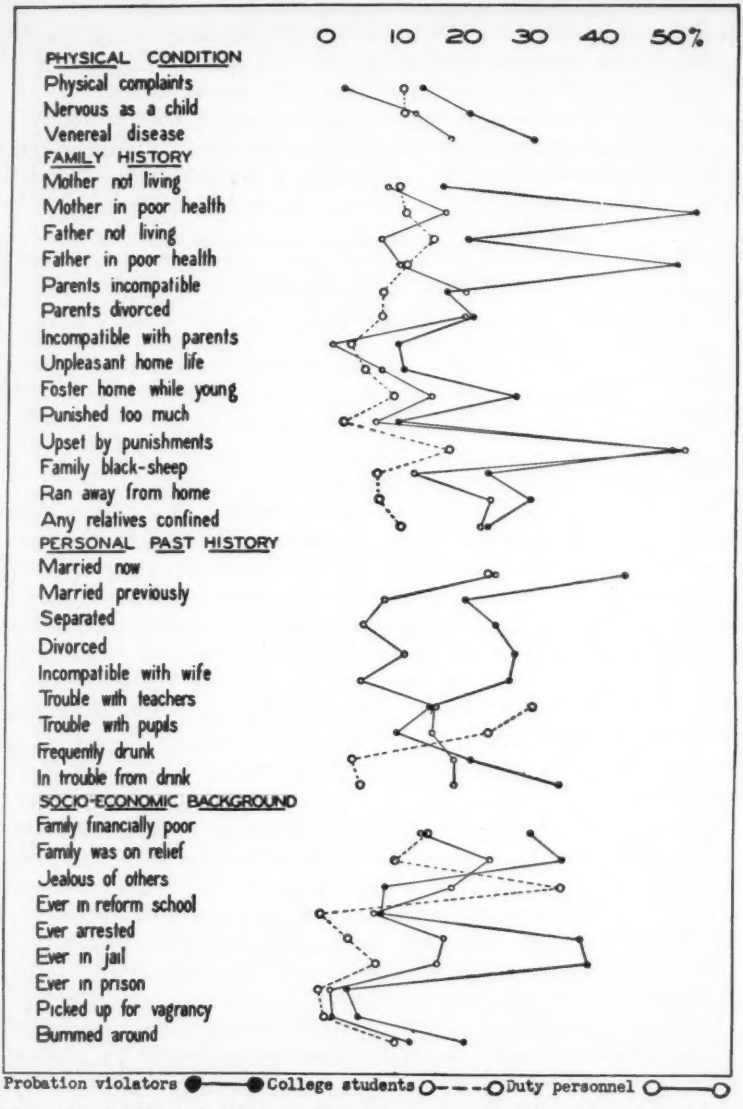

Figure 2.—Profile study: A summation of various personality and environmental factors composing the background of the three groups.

college students, and 18.9 percent of the duty personnel stated that they got drunk frequently. More significantly, 34.5 percent of the probation violators, 5.8 percent of the college students, and 19 percent

of the duty personnel admitted that they got into trouble as a result of drinking.

The use of drugs was insignificant.

MARITAL HISTORY

Complete marital history from the college students was not available. The average age at which the probation violator married was 20.5 years; for the duty man it was 22.1 years. Of the 142 probation violators 44 percent were married at the time this information was gathered, as compared to 23.8 percent of the college students, and 25.5 percent of the duty personnel. Twenty-two percent of the probation violators and 9.2 percent of the duty personnel stated that they had been married before. A considerable higher separation and divorce rate was noted among the probation violators, their percentage being 26.4 percent separations and 27.8 percent divorces, compared with 6.9 percent separations and 12 percent divorces among the duty personnel. Further indication of the unstable marital situation of the probation violators was evidenced in the fact that 27 percent of them stated that they did not get along well with their wives, against 6.1 percent for the duty group (fig. 2).

EDUCATIONAL BACKGROUND

The last grade completed by the probation violators ranged from none to 14 years, that is, the second year in college. The mean grade

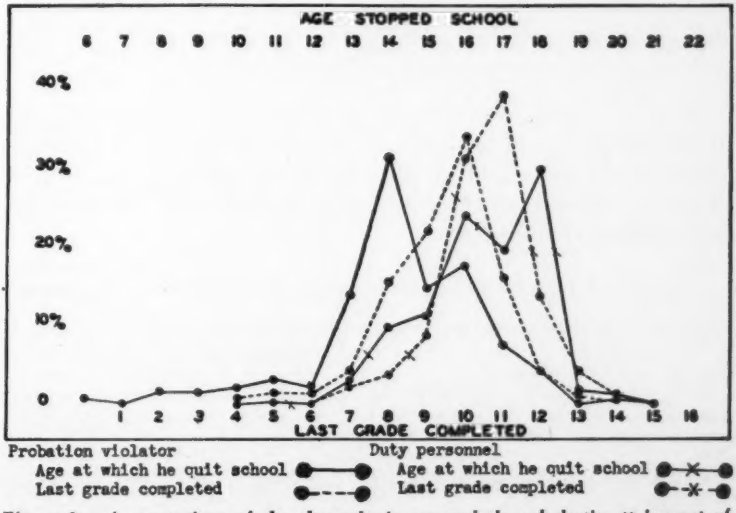
AGE STOPPED SCHOOL
6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22
40%
30%
20%
10%
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
LAST GRADE COMPLETED
Probation violator
Age at which he quit school
Last grade completed
Duty personnel
Age at which he quit school
Last grade completed

Figure 3.—A comparison of the chronologic age and the scholastic attainment of the probation violator and the duty man showing a retardation of approximately 2 years in the case of the confinee.

attained was 8.1. The duty personnel's education ranged from fifth grade schooling to a second-year college, with a mean level of 10.3. Figure 3 is plotted to demonstrate the comparison between the chronologic ages of the two groups and the highest grade attained. Both groups were arbitrarily assumed to have started schooling at age 6 years. Actually, the mean age at which the probation violator began school was 6.1 years and for the duty man 5.6 years.

Table 5 compares grade failures in the three groups. The third and fifth grades were the most hazardous for the duty man and the confinee. An unexpected comparison appeared in the replies to the question of trouble with teachers. The college students gave 30.6 percent positive answers. The probation violators and the duty men gave 16.3 percent and 16.8 percent respectively. The percentage relationship was proportionally similar when it came to the matter of trouble with other students (college students, 24.3 percent; probation violators, 11.4 percent; and duty personnel, 16.0 percent).

TABLE 5.—*Comparison of failures in school in the group of probation violators and duty personnel*

Number of grades failed	Probation violators		College students		Duty personnel	
	Number	Percent	Number	Percent	Number	Percent
0	64	50.8	173	87.8	108	56.0
1	33	26.1	23	11.6	65	33.7
2	16	12.8	1	0.6	16	8.3
3	10	8.0	0	0	4	2.0
4	2	1.6	0	0	0	
5	1	.7				
Total	126	100.0	197	100.0	193	100.0

Table 6 indicates that different motivating forces forced members of the two groups to leave school. The larger percent of probation violators who left school for financial reasons indicates the pressure of home problems which continued to influence the actions of the individual after enlistment.

TABLE 6.—*Reasons given by probation violators and duty personnel for leaving school*

Reason	Probation violators		Duty personnel	
	Number	Percent	Number	Percent
Joined service	21	16.4	78	42.0
Went to work	78	61.0	44	23.6
Didn't get along	15	11.6	24	12.9
Other (sickness, money, graduation, inaptitude)	14	11.0	40	21.5
Total	128	100.0	186	100 0

SELF-EVALUATION

As a part of the questionnaire, items were included which registered the individual's evaluation of himself. An attempt was made to evaluate these responses in terms of actual performance. In the matter of recidivism, this factor of self-evaluation seems to have relatively little diagnostic value; however, as a general statement, it can be said that the probation violator tended to identify himself with the positive traits of others. He appeared to overevaluate his favorable personality traits and to underestimate his adverse characteristics. On the other hand, both the duty man and the college student listed more characteristics of the depreciatory type. This phase, undoubtedly, warrants further investigation. The subject was not pursued exhaustively in this study because of its limited value to the subject at hand.

EARLY NEUROTIC TRAITS

That considerable accent has been placed on the basic personality as reflected by early neurotic traits, has been demonstrated through stud-

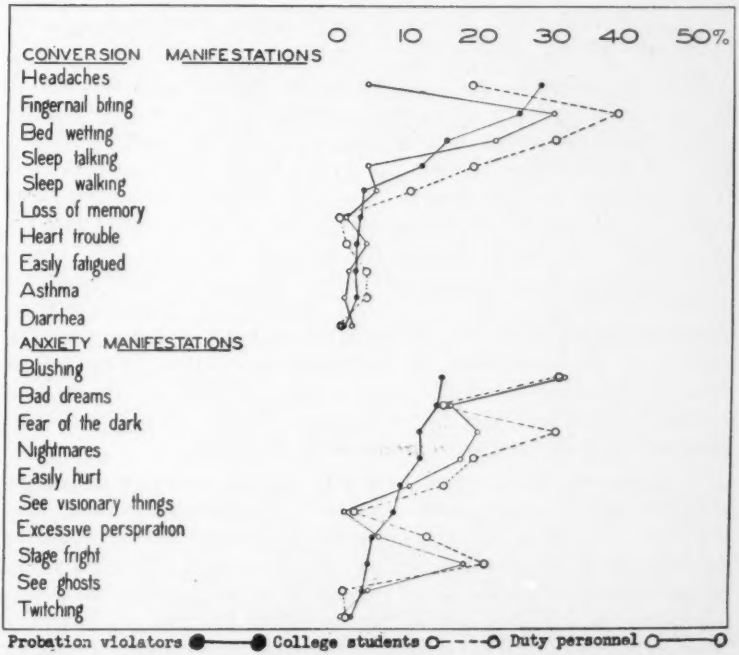

Figure 4.—Early neurotic tendencies: A comparative analysis of the three groups demonstrating the relationship of the probation violator to others with respect to admitted manifestations.

ies made during and immediately subsequent to the recent war (*2*). It has long been considered that these tendencies were indicative of the individual's inability to perform adequately in the Armed Forces. This study, however, revealed little significant difference between the three groups. Of those traits customarily classified as conversion manifestations (with the exception of the complaint of headaches), the probation violator was not exceptional. The two better adjusted groups consistently totaled a higher percent of anxiety manifestations than the probation violator (fig. 4).

DISCUSSION

It was hoped that by comparing the probation violators with two other groups, certain identifying characteristics could be noted in the preservice environment of the individual which would enable psychiatric examiners at induction centers to predict the potential offender. This study succeeded partially; however, no single factor stands out. This group shows certain tendencies which are strongly suggestive for classifying certain individuals as potential general court martial offenders.

Physical condition.—Physically the probation violator is in sound condition. He was considered to have been a nervous child.

Home background.—Such factors as size of family, lineal position in the family, and age of parents at birth of child vary so slightly among the three groups that their positive diagnostic value is doubtful. Of greater importance is the broken home situation, whether it is due to death, separation, or divorce, and the age at which the break occurred. Health of the parents and health of the subjects's wife are important. Of greater significance than the fact that the parents were unable to get along with one another is the fact that the probation violator was unable to get along with his parents. This indicates an unpleasant home situation. Unsatisfactory foster homes appear frequently in the background of the probation violator. Punishment, when it engenders a feeling of persecution or rejection and the solution of his problems by flight, increases the probability of the inadequate solutions by these persons to problems in service life.

Socioeconomic background.—Evidence supporting the principle that a bad community necessarily produces delinquency has only weak support. Poor financial status or poverty occurred in a large number of homes from which the probation violators came. This individual is not unusual in the matter of truancy or in having frequently been committed to a reform school, but he differs significantly in having been committed to jail or civilian correctional institutions. Probation violators consistently get into trouble because of overindulgence in alcohol.

Marital.—The probation violator is willing to "try" marriage at a relatively early age; consequently, he exhibits a higher separation and divorce rate than the others.

Educational background.—Mentally, the probation violator is dull and inadequate. Repeated failures in school through inaptitude, resentment, and poor ability to adjust are apparent.

Self-evaluation.—The probation violator tends to overevaluate himself in terms of his actual performance.

Early neurotic traits.—There was no significant difference among the three groups in regard to the manifestation of early neurotic traits.

PROFILE OF THE PROBATION VIOLATOR

The probation violator in his childhood showed evidence of his later personality traits by revealing, at an early age, his reaction to his poorly adjusted parents who were apt to have ill health based on poorly defined disorders, probably neurotic in origin. Their marital adjustments were unsatisfactory, and the events leading up to the disruption of the home (usually prior to his sixteenth birthday) produced in him a feeling of resentment and rebellion which were reflected in his later conduct. Poverty, and frequent shifting of home and interest, contributed early to the development of insecurity and a tendency to seek the pleasure of the moment because of the uncertainty of the future. This hedonistic need began to lead to minor delinquencies which earned for him the title of "black sheep." The early disruption of the family resulted in his placement in various "homes" which further contributed to his insecurity and inadequacy. His own lack of respect for authority, fostered by the poor example of his parents, the severity of the punishment they inflicted for minor breaches of discipline, the poor example set by his relatives, many of whom came in conflict with the law, and his own search for the "easy way," brought him into early and not infrequent conflict with the police.

He early demonstrated a tendency to seek flight as a solution to his conflicts. He was frequently truant when school became difficult, and left usually after several failures. He ran away from home if his parents became demanding. When physical flight became impossible because the conflict was within himself, he escaped by means of alcohol which further contributed to his difficulties because a false sense of well-being and superiority fostered by the alcohol made him belligerent and brought him into further conflict with authority. He frequently sought escape into marriage, but here found little comfort and as a consequence was divorced and remarried but not living in harmony with his second wife. Finding no satisfaction in his pur-

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suits, having no education for higher skilled tasks, he eventually entered the military service where his pattern of flight continued.

CONCLUSIONS

It must be admitted frankly that this study has fallen short of its original objective. It is believed, however, that sufficient value lies in the general psychologic profile of the probation violator to warrant its publication.

The lack of success is attributed in part to the following causes:

(*a*) The intrinsic difficulty of establishing such criteria.

(*b*) The lack of a control group in the true sense of the word. Such a group should have consisted of men who had successfully completed a period of probation subsequent to a general court martial and confinement. Due to administrative difficulties such a group was not available at this time.

(*c*) The tendency on the part of the general court-martial prisoner to conceal or evade questions relative to his past experiences, with the desire to appear as "no worse than the others," may have decreased the area of difference in many cases.

(*d*) No set of characteristics in which the probation violator was consistently high and the other groups correspondingly low was isolated. It is, therefore, suggested that a substantial constellation of these elements should appear in the experience and personality of the individual before he is discarded as a potential recidivist.

Much work must yet be done by the psychologist and the psychiatrist in this problem of probation violation, as well as in the problem of eliminating the original general court-martial offender. This study is presented in the hope that where we have succeeded others may take up the lead and follow through to a more successful conclusion and that others may profit by our mistakes.

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Current Trends in Medical Education[1]

MELVIN A. CASBERG, *M. D.*[2]

WE ARE just rounding out the first 50 years of the twentieth century, an era of medical progress unequalled during any similar period in history. Medical education has played a vital part in this achievement. Because medical textbooks often become obsolete even before the printer's ink is dry, and medical students begin their formal education from 5 to 10 years before they engage in the practice of their profession, medical educators are faced with a serious problem. A therapeutic solution taught in school today is not necessarily valid when an identical situation presents itself to the graduate 5 years later. Medical education, therefore, must work with a flexible curriculum molded to meet the demands of the present and to anticipate future trends. Faced with an ever-changing scientific order where that which was strange yesterday becomes commonplace today, and that which is commonplace today becomes antiquated tomorrow, medical education cannot rest on its laurels but must show continued progress or fail in its purpose. Constant, directed adjustment of subject material and a frequent reapportionment of time to subjects taught is vital to educational growth. Thus the mucosal ulcerations of typhoid fever must be assigned a respectful niche in the hall of medical curiosities, while cancerous ulceration of the intestine is placed under the investigative floodlight. The long periods of time spent in teaching the pathologic changes of red and gray hepatization of lobar pneumonia must be diverted to the study of degenerative heart disease.

Medical sciences are reverting to the basic sciences. The curtain of inaccessibility that surrounded the unexplored hinterland of medicine is being pushed back by discoveries in the basic fields. Operations are more successful today not because of improvement in the technical surgical skills, but rather because of a more thorough knowledge of

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[1] Presented at the monthly Medical Meeting, Army Medical Center, Washington, D. C., 18 May 1950.

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the intricacies of preoperative and postoperative care which are fundamental contributions of biochemistry. Regions of the body once inaccessible to the surgeon have been rendered accessible by advances in anesthesiology, which in turn is little more than applied physiology and pharmacology. The greatest single recent contribution to the therapeutic armamentarium of the physician—penicillin—came from the laboratories of basic science.

As the knowledge of medicine became more extensive there developed in medical practice the trend toward specialization. This tendency continued to the extent that as each new facet of a specialty was brought to light the process of fission gave rise to another until the number of subspecialties became legion. The movement is by no means new for, in the year 1854, at a meeting of the American Medical Association a resolution was introduced concerning the problem of specialization. A survey of medical students will reveal that about 50 percent of them wish to be specialists and this is not surprising in view of the fact that all who control undergraduate and graduate medical education are specialists. If this selectivity continues the organization of the medical profession will eventually become unbalanced. If 80 percent of the conditions bringing a patient to a physician can be handled adequately by a general practitioner then, in the interests of conservation of manpower and man-hours, we as medical educators are wasting a large portion of our time.

There has been evident, especially since the close of the last war, a rather bitter resentment on the part of the general practitioner against the favored lot of the specialist. Undoubtedly there is just cause for a certain amount of this, and the belief of the general practitioner that unfair discrimination exists has welded together a vigorous and vociferous Academy of General Practice. Medical educators are vitally interested in what path the medical profession will follow. Some would have us believe that eventually all physicians will be specialists and the future pattern of medical practice will be that of group clinics. They argue that lines of rural communication are improving and rural hospitals are springing up all over the country, hence this system will work in both rural and metropolitan communities. It is difficult to understand the logic of this reasoning, for such a plan of education and practice would result in a tremendous waste of time and personnel. Why train every physician to a specialty level when only 20 percent of man's ills require specialist care? The medical trainee as it is must follow an arduous, time-consuming course of studies before he "arrives" and it is doubtful that the lengthening of this training period would stimulate the enthusiasm of medical aspirants. Furthermore, human nature being what it is, one might predict that once a profession composed entirely of specialists had

been established there would arise a heirarchy of superspecialists. I believe that the general practitioner, in an improved version, is a permanent fixture on the American scene.

The latest statistics released by the American Medical Association reveal that there are now 200,000 physicians in the United States, one for every 750 people. This is the highest ratio of any nation in the world with the exception of the newly founded state of Israel where a higher proportion of physicians exists as a result of the great exodus of Jewish physicians from Europe. Social planners would have us believe that a real dearth of physicians not only faces us now but that the situation will continue to deteriorate unless schools of medicine greatly increase their numbers of graduates. Before accepting such a statement there are several factors to be considered. As certain procedures incorporated in the art of medicine became standardized they were turned over to subprofessional personnel. The early radiologists, for example, took their own roentgenograms, developed them, interpreted them, and followed the whole procedure from beginning to end. Such a situation does not exist today for the technician has assumed the responsibility for two-thirds of this procedure. By this transformation physicians have been freed from countless technical details and have more time available for direct patient care. There is no reason to believe that this trend will decrease.

Medical discoveries such as the antibiotics have led to the control of most acute infectious diseases and vast amounts of time have been released to physicians. Recently, I made rounds on the wards of a large municipal hospital that I had not visited since the completion of my internship and surgical residency about 10 years ago. The outstanding impression I carried away was the scarcity of patients with acute inflammatory diseases. Beds that 10 years ago were occupied by patients with lobar pneumonia, acute mastoiditis, and cellulitis of the extremities were used for other purposes. Is it illogical to assume that in another 50 years the proper physician to patient ratio might not be 1 : 1000?

During the first half of the twentieth century life expectancy in the United States has increased by about 20 years. Since 1900, although our population had doubled, the number of persons over 65 years of age has quadrupled. The age shift carries with it profound medical, social, and economic implications. Geriatrics will soon be no less important than pediatrics.

Man has created war weapons capable of delivering devastating blows into the very heart of the remotest enemy territory which means that, in the next war, civilian casualties will probably approxi-

mate or even outnumber military casualties. It was well demonstrated in the past world war that the successful handling of casualties from areas of catastrophic damage depended on organization. A skilled surgical team is of little value if the injured cannot be brought in for care. This organization for catastrophe should be of vital concern to medical educators. No medical student, whether he plans to practice in a rural or a metropolitan community, whether he anticipates service as a military surgeon or not, should be permitted to graduate without some basic training in this problem of mass casualties. The medical R. O. T. C. is bearing the brunt of this educational program at present and well it should, for the Medical Corps of the Army is well qualified to instruct in this organizational problem. Lest these words be taken as the superficial compliments of a guest speaker to his hosts, I should like to add that Saint Louis University School of Medicine has, by over 100, the highest R. O. T. C. enrollment of any medical school in this country. Such interest is readily obtainable if the students realize that the medical school administration stands behind the professor of military science and tactics.

There has been criticism both by certain of the curricular-hour-conscious faculty and time-pressed students but, on careful explanation of the program, I have been able to impart to these critics my feelings of deep responsibility and obligation in this time of international tension for the indoctrination of every medical student with basic information regarding planning for catastrophe. In my opinion the inculcation of military medical organization in students of medicine will, in the event of a national disaster, result in the saving of thousands of lives.

Graduate professional training given in the Army hospitals since the last war has been of a high order. It is distinctly to the advantage of medical education that military medicine stands at the highest level of professional and administrative skill since its inception. Furthermore, the close liaison between the military and civilian medical professions is of utmost importance in these days of international unrest. My only fear at the moment is that false economy might inadvertently destroy the results of these years of coordinated labor on the part of military and civilian physicians alike. In the not impossible event of war, it would be a tragedy to find an emasculated Medical Service! My experience in the past war convinced me of the inestimable morale-building value of a well-coordinated, smooth-functioning medical service. In the face of possible future mass destruction of the civil population dare we trifle with the structure of military medicine when its units must form the nucleus on which civilian medicine will depend for organization? Civilian morale in any future war may well determine victory or defeat.

The last two decades have witnessed a renaissance of certain social movements in the United States which may have an important effect on the future of the medical profession. Basically two sections of our population have brought about this resurgence of social consciousness, namely the labor unions and the farmers. These elements have exerted a great political pressure on our country and there is no reason to believe that this will decrease. Medical leaders of today must appreciate these trends in public thinking and demonstrate their readiness to assume the leadership in the solution of social problems. Medical schools in great part have failed to educate students as to their social responsibilities. In an effort to remain within the bounds of pure science, educators have shunned this problem, and this neglect is largely responsible for the serious socioeconomic crisis now faced by the medical profession. We take great pride in developing a student who is capable of making a most difficult diagnosis and yet suffer few if any pangs of remorse as this brilliant young physician demonstrates an utter ignorance of his social responsibilities to his patients.

PREMEDICAL PREPARATION

There is no standard premedical curriculum nor, indeed, should there be one. The Council on Medical Education and Hospitals of the American Medical Association and the Association of American Medical Colleges have prescribed basic minimal requirements for entrance into medical school but beyond these prerequisites no further curricular advice is submitted. Schools of medicine differ somewhat in their admission regulations but most academic bulletins include fairly standard minimal quantitative, qualitative, and subject requirements. The combined credit hours of the premedical subjects, however, do not comprise half of the total required for college graduation. Thus wide latitude is presented in the choice of elective studies. Professional scientific education has become so time-consuming in terms of years of preparation that there has developed in educational philosophy, a trend in the direction of pruning off all curricular activities not directly related to acquiring a degree. This is unfortunate for, while it is usually accepted that the studies pursued in the undergraduate years must have some relationship to the subject matter of the medical curriculum, a broad educational foundation is indispensable to the development of a well-rounded physician. It is important that the applicant to the school of medicine shall have acquired that culture which has been traditionally associated with the Bachelor of Arts degree.

Dr. Rappleye, Dean of the Faculty of Medicine at Columbia University, in a recent paper [3] writes that "college preparation for medi-

[3] Read at the Thirtieth Annual Meeting of the National Health Council, 24 March 1950.

cal, dental, and public health fields should not be preprofessional in character" and that "education is not 'pre' anything, but should be devoted to the objective of providing as broad a cultural education as the institution can provide." The lack of sound cultural education has led to a state of affairs where the technologies have far outstripped our social and spiritual structure. Man splits the atom and then cowers in fear lest this scientific monster turn and destroy its creator. Dr. Allen, president of the University of Washington, has aptly stated that well-rounded development of character and personality are "qualities never *lacking* in good physicians and without them intellectual development, however brilliant, is socially useless and possibly dangerous." [4] In the selection of medical students scholastic achievements cannot be substituted for excellence in character. The school of medicine carries deep responsibility in ascertaining insofar as possible the capability of the applicant to use the knowledge and skill to be acquired through medical education in a manner beneficial both to society and to himself.

There is no such thing as a typical premedical student and medicine rather than being a single career is actually a multiplicity of careers. Although the art and science of medicine may embrace the philosopher as well as the technician, the recluse as well as the extrovert, the poet as well as the statistician, each applicant to the school of medicine should present substantial evidence that he or she has mastered the basic fundamentals of chemistry, physics, and biology, and furthermore that this mastery will continue into the period of formal professional training. Now that we appreciate the acceptable qualifications of an applicant, our greatest problem is that of determining whether he has these qualities. How can we as members of an admissions committee be sure that a proper blending of the necessary academic and character ingredients exists? The transcripts of grades and admission tests present certain alphabetical and numerical ratings that give a more or less confortable assurance as to the applicant's intelligence, but how does one determine character? Letters of recommendation are of value only insofar as the testator's objectivity is reliable. I maintain that without much difficulty a graduate of Sing Sing could obtain letters of recommendation that would present him in a favorable light as a candidate for a divinity school.

Numerous papers have been written on the methods of interview best suited to determine qualifications for admission to a school of medicine. Some prefer the "solo" interrogation system in series so that the applicant is never outnumbered in this battle of wits. Others still prefer the "police court" system where the would-be physician

[4] Medical Education and the Changing Order.

faces a battery of interrogators. I doubt the real contribution of this method of evaluation. How many of our medical leaders of today would receive high scores on an interview basis? Certainly, actual contact reveals information as to dress, speech, and mannerisms but can this be interpreted in the light of future success or failure in medicine? We may question at length the applicant's motivation in his desire to study medicine but how can we be assured that the answers are fundamentally honest? I do not wish to imply that character recommendations and personal interviews should be dispensed with in the selection of medical students, but rather to caution lest too important a role be assigned these adjuncts of the admission committee. Frankly, those who might be best qualified to judge admissibility are not the faculty of medical schools, but rather the premedical faculty, who have had opportunity to follow these aspirants through 3 or 4 years of preparation. A close liaison between the medical and premedical faculty may be of inestimable value in the problem of proper selections. In view of the fact that the ultimate choice of the men and women who will become the future physicians of America rests solely in the hands of admission committees of the medical schools, it is the responsibility of these committee members to consider their roles with deep seriousness.

THE PRECLINICAL CURRICULUM

Strict departmentalism presents a barrier to the correlation of the medical school curriculum both horizontally between contemporary subjects and vertically between the preclinical and clinical years. A medical faculty which appreciates that its prime responsibility lies in teaching the science of medicine and not the science of biochemistry or physiology is wise indeed. To each department head his subject is the cornerstone of medicine and a dean must practice all the wiles of diplomacy in order to balance the intellectual budget of curriculum hours. Through the past 50 years various basic departments have attracted the spotlight of attention, beginning with anatomy and continuing to the present with biochemistry now standing in the center of the preclinical stage. The lack of horizontal correlation between subjects taught concurrently results in a great loss of time, integration, and cohesion. One technique of color picture printing involves the serial superimposition of three or four basic colors in the formation of the finished product. Any one basic print, if studied alone, would give an inadequate idea of the final scene, and yet this is the system too often used in preclinical instruction. How inefficient to study the structure of the stomach in the anatomy laboratory and then at a different time and place restudy the muscular functions of this same organ in

physiology and again the secretory functions in biochemistry. By combining the study of structure and function not only is precious time saved, but even more important the final picture is correlated, clear, and complete.

Departmental boundaries shift with time and place. Who is to determine where the dividing line between biochemistry and physiology lies? Will the lectures on digestive secretions fall to the lot of the biochemist or the physiologist? The exact point of division is of little significance and a partial erasure of departmental lines with closer correlation in the teaching program is desirable. The correlation must, however, be intelligently supervised lest certain subjects be covered more than once and the others not at all. The shortness of the time the student is exposed to these courses makes it imperative that the faculty select their instruction material carefully.

Too often the first 2 years of medical education present the student with a mass of facts far in excess of that which he can retain, until the poor bewildered recipient of this deluge of instruction vainly struggles to remember faster than he forgets. Some medical wit has said that the difference between a freshman and a sophomore student is that when the professor says, "Good morning," to the first-year class they reply in like manner verbally, but when the second-year class is thus greeted they promptly write it down in their notebooks. There is grave danger in a curriculum which is so overwhelming in its factual presentation that it tends to create memory experts and destroys the investigative scientific initiative of the student. Furthermore, medical educators in the basic sciences must beware lest they develop a philosophy among their students that the printed scientific word is final. The effects of such distorted thinking become evident in the laboratory when the student's prime interest lies in the attempt to direct the results of his experiments to conform with those of the textbook.

Every preclinical student should have available the time and facilities to stimulate his curiosity and originality. The administration of a medical school should make it possible for a student who so desires to spend an additional year or two in research in one of the basic sciences. Saint Louis University School of Medicine has established assistantships encouraging the medical student to participate in such a program. A vertical correlation of the preclinical and clinical curriculum is of value in emphasizing the importance of certain rather prosaic courses. For example, in discussing the various tracts of the spinal cord in neuroanatomy, the Department of Neurosurgery might well demonstrate a postoperative chordotomy in which the spinothalamic tracts have been sectioned; or during the dissection of the

inguinal region on the cadaver the presentation of various types of inguinal hernias will serve to enliven the interest of the student in his partially dissected corpse lying in its academic shroud. Whereas a certain amount of clinical information might well be given the preclinical student, I cannot consider it good pedagogy to expose the freshmen and sophomores to advanced clinical subjects for which they do not have the proper foundation. Such instruction leads to incorrect interpretation and faulty habits of deduction. Enthusiasts who prematurely would release students to advanced clinical courses with the explanation that they must learn to reason and correlate for themselves are acting on a false premise.

Next year at Saint Louis University School of Medicine the academic session will be broken into three periods of 13, 10, and 10 weeks in order that the Christmas and Easter vacations might fall at the close of a period. Thus major examinations are completed before the vacations and the student goes home to relax rather than to wear himself out cramming for semester tests. Frankly the incentive for this change came from my memory of the severe mental conflicts during Christmas vacations in reference to the question to study or not to study.

THE CLINICAL CURRICULUM

Until recent years, the preclinical departments have, with some relief, turned the third-year medical students over to the clinical faculty and then have forgotten about them. Current trends in medical education stress the necessity for close correlation between the preclinical and clinical curriculum. The biochemist should participate in discussions of preoperative and postoperative fluid balance just as should the physiologist contribute to the general presentation at a clinical pathologic conference on renal failure. The value of such correlation lies not only on the better instruction of the student but also in the stimulation of mutual interest on the part of clinician and basic scientist alike in a clearer understanding of their common problems.

Long hours of classroom lectures have been replaced by clinical clerkships. This is good pedagogy. I remember very little of my classroom lecture on the catatonic phase of schizophrenia but indelibly recorded in my memory is the schizophrenic girl with masklike features who held her arm fixed in any position to which the psychiatrist moved it. Instruction in the presence of the patient for small groups of students permits a teacher-pupil intimacy that cannot be reproduced in the classroom. The pendulum of clinical medical education is swinging even further than small group instruction and on to the preceptorial method of teaching. This system has been held in high esteem since the earliest historic period and was the accepted vehicle

for training physicians until late in the last century. I have given serious consideration to the advantages of the preceptor system and have inaugurated a student apprenticeship this year that has acted as a pilot test for future application.

One of the important values of a preceptorial form of instruction is the development of a better appreciation of the fine art of physician-patient relationship. Just how does one approach Mrs. Smith to inform her that she must have her breast removed because of a malignant growth? The student may give a scholarly discussion on the diagnostic interpretations of a bleeding nipple or the fine points of microscopic differentiation between a scirrhous carcinoma and an intracystic papillary adenocarcinoma, but at the same time may be ineffectual and callous in his attempts to discuss the situation in simple practical terms with the patient. Such intimate teaching methods require an increased faculty. The use of younger instructors is the solution to this problem. I have been most satisfied with the high caliber of teaching and the degree of enthusiasm demonstrated by the recent graduates from residency training. Because of their recent educational exposures these younger men and women are in a position to differentiate between good and poor methods of instruction. Furthermore, they have more time to donate than do their older colleagues. Medical schools have not been sufficiently aware of the unlimited teaching talent existing in their recently graduated physicians.

A horizontal correlation of contemporary subjects is just as important in the clinical as in the preclinical years. Much of our instruction stimulates the student to think in terms of departmental boundaries, and this is a serious pedagogic error. Too frequently the junior and senior student on the surgical ward thinks only in terms of surgical diseases and then of psychosomatic conditions alone while on the psychiatry service. We cannot afford as medical educators to forget that the subject matter of interest to the student should be the patient as a whole rather than any artificial subdivision of the patient formulated to suit the convenience of a hospital or a school of medicine. In keeping with this concept, Saint Louis University School of Medicine in conjunction with The University Hospital has established a pediatric heart clinic planned along the lines of a functional unit. This clinic falls under the jurisdiction of neither the department of medicine nor of pediatrics. It is staffed by a functional team of a pediatrician trained in child heart diagnosis, a radiologist familiar with the diagnostic problems of pediatric heart disease, a pathologist experienced in congenital cardiac anomalies, and a surgeon trained in congenital cardiovascular surgery. These men are erasing the boundaries of departmentalism and students are being influenced to think in terms of whole functional units.

A well-staffed, smooth-working university hospital might well be the envy of the medical profession and yet because of its very efficiency there may be certain educational shortcomings in that a student in his clinical years on the hospital wards may gain a distorted notion as to the relative frequency and importance of disease entities. An instructor finds that it is easy to interest his students with a discussion on a rare malady. Thus uncommon and difficult cases become the daily fare. Unless the teacher makes an effort to evaluate the relative frequency of diseases the student will graduate without appreciating the fact that patients partially disabled by chronic or minor illnesses, who are not admitted to hospitals, make up a large percent of those who are sick. I must confess that following my training in surgery, whereas a gastric resection presented no serious problem there were certain minor surgical conditions that strained my ingenuity simply because, during my residency, I had not had the opportunity to become familiar with them.

The clinical student must appreciate that hospital pajamas are a great equalizer of men. The bank president and the bank clerk may look exactly alike removed from their environmental background. Their symptoms may be identical and their ulcers may look alike under the fluoroscope. Since, the one might easily afford a trip around the world to ease his nerves, while the other possibly could not obtain the funds for a trip to the nearest pleasure resort, ideally the student should be given opportunities to follow the study of his patients into their home environments.

Although space does not permit a discussion of internships and residencies, medical schools are interested in this phase of graduate training. One cannot draw a line between the senior medical student and the intern and state that there is any basic difference in the educational formula to which these students should be exposed. There is actually much less instructional difference between the senior medical student and the intern than there is between the preclinical sophomore and clinical junior years of medical school. Ideally the postgraduate hospital training should be under the direct supervision of the school of medicine. There is a definite trend toward "straight" internships and some believe that the "rotating" internship will soon be a thing of the past. I do not consider the "straight" type of service an internship but rather feel that it is a first year in a specialty residency program. This trend is of great importance to schools of medicine in that the type of training afforded by "rotating" internships must be made available to the student prior to graduation. In other words the junior and senior students will be acting in the capacity of interns and the intern year must of necessity be absorbed into the undergraduate clinical curriculum.

The successful practice of medicine entails a dual progression, namely, progress in the art as well as in the science of medicine. In order that the art might flourish it is necessary for the physician constantly to return and refresh himself by dipping generously into the ever-progressing river of science. The voodoo witch doctor practices an art of healing but his failure lies in the lack of coordination with the science of healing. We shall fail as educators unless the student is imbued with an insatiable desire to continue studying throughout his professional career. The ceremonial function for the granting of a diploma is well termed, the Commencement, for, to the true physician, this is but the initiation of a never-ending process of medical education.

Coordination of Administrative and Professional Effort in Army Hospitals[1]

WARNER F. BOWERS, *Colonel, MC, U. S. A.*[2]

ALTHOUGH the average hospital operates as though there were an unbridgeable gap between administrative and professional functions, actually they overlap. The necessary coordination and cooperation are founded on mutual respect, understanding of the problems of each, and, above all, a common goal, namely, optimal patient care. Please etch on your memory the fact that were it not for patients, there would be no need for physicians; and were it not for physicians, there would be no need for nurses or for the ancillary corps. This point is too often forgotten by Medical Service Corps officers, nurses, and physicians. Let me emphasize the importance of the middle word in the name of one ancillary corps—service. The connotation of this word has been known to physicians and nurses for centuries but is relatively unfamiliar to the nonmedical assistants who, in ever increasing numbers, are becoming concerned with the care of the sick and injured. Wider realization of the benefits of service to others with its broadest implications, would be of the utmost assistance to the country as a whole in these times of arrant self-seeking.

The sooner we realize that all those who work in the hospital are part of a team striving for a common end, the sooner shall we attain the goal of optimal patient care. Patients are querulous, uncertain, and insecure because of their illness, its strangeness to them, the uncertainties of the outcome, and the unfamiliar hospital surroundings. What is a daily routine to you and of no particular moment may be of great seriousness to a patient. Consequently, patients need more than average consideration and sympathetic handling. This, of course, does not mean coddling, overprotection, or encouragement of self-pity. Nor does it mean that convalescent patients should be treated like

[1] Presented to class of Medical Service Corps and Women's Medical Specialist Corps officers taking the Improved Management Methods Course at Valley Forge General Hospital, 4 April 1950.

[2] Office of the Surgeon General, Department of the Army.

sick patients. Convalescent patients must be made to feel that duty is preferable to remaining in the hospital and this requires an entirely different method of handling. Nurses will tell you that patients who have been very ill cannot understand the apparent change in the attitude of nurses and physicians as they get well. Such patients often feel abused until an explanation is given.

Most of the patients' contacts in the hospital are with persons other than the physicians. Patients themselves do not realize the necessity for this and often complain that they rarely see a physician. Patients take medical care for granted and the other contacts are the ones longest remembered. Patients remember the food and general atmosphere rather than treatment received. Since these are the facts, it is essential that we make every member of the team aware of the importance of nonmedical contacts. To visitors, the most important person in the hospital often is the enlisted man at the information desk or switchboard. To the patient, the most important contacts are with enlisted man, nurse, and physician in the receiving room. It takes a lot of later favorable impressions to counteract the first unfavorable reaction to lying on a stretcher for a long period in the receiving room waiting for someone to do something.

You probably feel that after the course you have received, you fully appreciate the implications of what I have said. When I read a preliminary draft of this paper to interested officers in our office, I was told that I was talking about ancient history and that all was now changed. However, having had some experience as a reactionary, I feel that this is a little optimistic. I wish it were that easy to change what has been accepted for years. This will become readily apparent at your first duty assignment when you will discover that it will take a continual struggle to put across the new ideas you have been taught; anything new accepted only with great difficulty. If you believe that our hospitals are run for the benefit of sick patients the following questions are still pertinent. For whose benefit do we arouse patients at 0530 hours? Few well people arise at that hour and I cannot be convinced that it is beneficial for the sick. For whose benefit do we serve the evening meal at 1630 hours? What well person eats dinner at such an hour? This simply forces patients to stuff themselves later at a snack bar or get into trouble by raiding the ward-kitchen icebox. For whose benefit are supplies neatly stacked on shelves in locked warehouses? Many instances can be quoted in which professional services submit requests or make complaints about nonavailability of needed items which have been in their own medical supply warehouse all the time. Medical supply officers should urge chiefs of service to go through the warehouses periodically or perhaps distribute lists of

newly acquired items at suitable intervals. For whose benefit do we keep patients in hospitals for days or weeks after they are fit for duty while some clerk shuffles the papers, writes for a service record that could have been procured weeks earlier, or does many things that could be done just as well after the patient has left the hospital? In none of these and many other instances can it truthfully be said that we are basing our system on the best interests of the patient.

Mutual respect and cooperation depend largely on the feeling that the other person knows his job and is doing it well. This feeling can be only incompletely present unless we know what he is supposed to be doing and why. This point cannot be stressed enough. Physicians especially are guilty of failing to understand the necessity for what they consider red tape. Why are three copies of certain correspondence necessary? Because three separate offices must maintain a record file. Why must the supply officer have a written request? Because he must have something to show why, when, and to whom he made issue. Why must the clinical records be complete and accurate? Because they frequently become evidence in legal or administrative procedures, even years later. Why must the registrar be notified of the decision to discharge a patient as soon as the physician can make up his mind? Because records must be obtained from elsewhere, orders must be issued, and other time-consuming procedures are necessary. I have always found it advisable to explain these matters in detail to officers on a professional service, repeatedly and at regularly scheduled conferences. Conversely, I have always found it advantageous for all officers, administrative and professional, to attend the regular staff meetings in which professional matters are discussed. This necessitates a little extra work to insure that what is said is clear to all present, but the increased mutual understanding justifies the added effort. Many times when you do not get along well with another person and have a developing feeling of antipathy, it is because you do not know him well enough and are not acquainted sufficiently with his problems and aims; this is particularly true with groups of people such as those in the various hospital services. If you are not getting along well with those in another service in the hospital, it is possible that you are at fault because of a narrow outlook or insufficient understanding of the problems involved. Learn all about the other services, their aims and problems before passing judgment or commenting unfavorably on them.

One other problem has become a cause for serious alarm both in the service and in civil life; I refer to the current tendency to avoid work. Everyone has to have an executive assistant to do the work. Physicians no longer want to take care of patients but simply issue

the orders to a younger physician or intern in training. Younger physicians quickly pass the orders along to a subordinate. Nurses in general must have nurses' aides to do the work for which nurses have traditionally been trained. Now, occupational therapists must enter at the supervisory level and have less-skilled aides to do the work. Ward officers must have Medical Service Corps executives to carry the burden. The semiludicrous picture of a private having to do the work only because he has no one to whom he can delegate it, is all too true. What we need is people who see what is necessary to be done and are not above going at it themselves. The pyramiding cost of medical care, which in many cases is the physician's fault because he allows the trend to continue, gradually widens the chasm between the physician and his patient by interposing more and more extraneous helpers. This course, showing you means by which high-grade care can continue to be made available at less cost and with fewer persons participating, is a splendid and timely innovation that will be of great help in convincing critics that we have something constructive to offer as a solution for current problems.

The aim of our team is cooperation between all services of the hospital to the end that the patient is effectively, efficiently, and economically served; anything less is not acceptable. Our hospitals must be so organized and administered that they give this type of service in peacetime and yet are capable of functional expansion without disruption or turmoil in time of war. Development of our teamwork, with consequent improvement in hospital-patient relationship, is a fertile field for further development by you as pioneers.

About the Army Medical Service

Medical Corps Officer Classification

FRED J. FIELDING, *Lieutenant Colonel, MC, U. S. A.*[1]

THE Medical Corps officers' classification policy was revised on 27 June 1950. In general the criteria for the award of the various prefixes used with Military Occupational Specialty (MOS) numbers to indicate proficiency has been tightened. It is believed the new criteria will be a better guide to commanders in the field in making assignments that will give the officer an opportunity of performing on the highest level for which he is qualified.

Alphabetical prefixes denoting degree of proficiency have not been established for use in connection with Medical Officer, Command (3500) and Medical Officer, Staff (3000). There is only one professional progression pattern under the career guidance program of the Medical Service for these two MOS's. Therefore, while following one specialty, ample opportunity is provided for necessary experience in the other and at times the staff officer performs additional duties of Medical Officer, Command, as in the case of a post surgeon who also commands the station hospital of the post. In the higher levels of these positions the assignments are correlated with rank and past military experience. The officers selected must have demonstrated outstanding ability in medico-military administration and have had extensive staff and command experience. Officers with a primary classification in a professional field will be changed immediately to a primary staff or command classification when ordered to such duty, provided that it has been determined that the future career of the officer will continue along staff or command channels. Some such officers may continue to carry their professional classification as a secondary MOS.

For the professional MOS's the following changes have been made in the criteria for the D, C, and B prefixes.

Group D prefix now will be awarded only on the completion of 12 months' residency or fellowship in all specialties rather than under

[1] Personnel Division, Office of the Surgeon General, Department of the Army.

the old policy where officers in many of the specialties could receive D prefix 6 months after residency training. Likewise, officers without formal training will now require, for all specialties, 18 months of duty limited to the professional field instead of the 12 months formerly required for many specialties. One exception to this criterion is the award of certain secondary subspecialty classifications to officers already qualified as A, B, or C internists or surgeons.

Group C prefix will now be awarded only to officers who have recently completed the formal training required to meet the American Board requirements for certification; whereas, in the past officers have been awarded a C prefix after completion of 2 years' residency training. This will mean that now an officer will not receive his C prefix until after completion of 3 years of formal training in the major specialties. Likewise, officers without the formal training required must have professional duty or practice limited to the professional field for a minimum of 5 years for all specialties prior to the award of C prefix. In the past this required period has varied from 3 to 5, 4 to 6, or 5 to 9 years, depending on the specialty involved. Again exceptions are made in regard to the award of a C prefix in secondary subspecialties for officers already qualified as A, B, and C internists or surgeons.

Group B prefix, in the future, will indicate that the officer has been certified by the American Specialty Board for his particular classification. Officers who have been awarded the B prefix without a board certification will continue to retain this prefix designation as long as their performance of duty indicates continued ability to function in the specialty without professional supervision.

Group X.—For the first time a new prefix appears in the medical officer classification policy. This prefix is an indication that the officer to whom it is awarded has qualifications in research that are associated with the specialty field identified by his MOS. The need for some specific designation of officers qualified or trained in research has been recognized by this office for a considerable period. An attempt has been made to establish a specific MOS for this type of officer but technical difficulties and other problems have precluded such an MOS being established. In lieu thereof, the Surgeon General's Office was authorized to use the prefix system to designate an officer qualified or engaged in research. This has been done now by the establishment of the prefix X.

The new classification policy also defines for the first time the prefix designation identifying the degree of proficiency for the Radiological Defense Officer (3004). Although the same prefixes X, A, B, C, and D are authorized in connection with this MOS, the definition and

criteria under which these prefixes are awarded are quite different from those used in connection with other professional MOS's. This difference must be kept in mind when considering the qualifications and degree of experience of medical officers with MOS 3004.

Medical Officer, General Duty (3100) is a basic MOS. It indicates that an officer is qualified to perform various medical functions in a hospital, dispensary, field unit, or other military installation, rather than being limited to one particular field. In addition, it is used to designate the primary classification of officers assigned to duty as interns in either civilian or military hospitals. The alphabetical prefix denoting the degree of proficiency will not be used in connection with MOS 3100.

It is believed that this new change in policy will result in a more efficient classification and utilization of medical officers.

True Cause of Death

It is extremely important that medical officers consider carefully the diagnosis which they designate as the cause of death, especially in the case of retired personnel dying in service hospitals. The lack of careful consideration may work an unforeseen and unwarranted hardship on the widow or other dependents of such personnel because pensions and other benefits provided by law may be payable only if death was a result of a service-connected disability. For example, if an officer who was retired several years earlier for disability resulting from general arteriosclerosis with cerebral or coronary focalization dies and an autopsy reveals the presence of a carcinoma, the death may still have been caused by the arteriosclerosis. If the medical officer attributes death to the cancer his widow will not be entitled to receive the pension that she would receive were the primary cause of death listed as arteriosclerosis. Numerous other examples could be given but the principle is the same and because it was the intent of Congress to provide for these widows it is both thoughtless and unjust to deprive them of a pension in this manner, unless the medical officer is convinced beyond all reasonable doubt that the disease which was the basis for retirement was not the factor causing death directly or causing the disease from which the person actually died. Nothing stated herein is to be construed as justifying or condoning the falsification of a cause of death for the sake of getting a widow a pension when the true circumstances as covered by law would not permit it.

BOOKS RECEIVED

A TEXTBOOK OF GYNECOLOGY, by Arthur Hale Curtis, M. D., *Emeritus Professor and Chairman of the Department of Obstetrics and Gynecology, Northwestern University Medical School; formerly Chief of Gynecological Service, Passavant Memorial Hospital, Chicago,* and John William Huffman, M. D., *Associate Professor of Obstetrics and Gynecology, Northwestern University Medical School; Attending Gynecologist, Passavant Memorial Hospital, Chicago.* 6th edition. 799 pages, with 466 illustrations, chiefly by Tom Jones, including 37 in color. W. B. Saunders Co., Philadelphia, Pa., publisher, 1950. Price $10.

SAINTS, SINNERS, AND PSYCHIATRY, by Camilla M. Anderson, M. D., *Assistant Clinical Professor of Psychiatry, University of Utah.* 206 pages. J. B. Lippincott Co., Philadelphia, Pa., publishers, 1950. Price $2.95.

COLLECTED PAPERS OF THE MAYO CLINIC AND THE MAYO FOUNDATION, edited by Richard M. Hewitt, B. A., M. A., M. D.; A. B. Nevling, M. D.; John R. Miner, B. A., Sc. D.; James R. Eckman, A. B., M. A., Ph. D.; Katharine Smith, B. A.; Carl M. Gambill, A. B., M. D., M. P. H.; and Florence Schmidt, B. S. E. Volume XLI, 1949, published June 1950. 820 pages; illustrated. W. B. Saunders Company, Philadelphia, Pa., publishers, 1950. Price $10.50.

OFFICE TREATMENT OF THE NOSE, THROAT, AND EAR, by Abraham R. Hollender, M. Sc., M. D., F. A. C. S., *Professor of Otolaryngology, Emeritus, University of Illinois College of Medicine; Attending Otolaryngologist, St. Francis Hospital and Mt. Sinai Hospital, Miami Beach; Consulting Otolaryngologist, Variety Children's Hospital, Miami, Fla.* 3d edition. 620 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., publishers, 1950. Price $7.50.

THE AMERICAN RED CROSS, A History, by Foster Rhea Dulles. 554 pages. Harper & Brothers, New York, N. Y., publishers, 1950. Price $5.

REGIONAL DERMATOLOGIC DIAGNOSIS, A Practical System of Dermatology for the Nonspecialist, by Ervin Epstein, M. C., *Consultant in Dermatology and Syphilology to be the Oakland Area Veterans' Hospital and Mt. Zion Hospital; Consultant to the Tumor Board at the Highland-Alameda County Hospital; Co-Editor of "Dermatologica" ("International Journal of Dermatology"); Abstract Staff of "Excerpta Medica"; Diplomate of the American Board of Dermatology and Syphilology; Member of American Academy of Dermatology and Syphilology and of the Society of Investigative Dermatology; Former president of the San Francisco Dermatological Society; Secretary-treasurer of the Pacific Dermatologic Association; Secretary of the Section on Dermatology and Syphilology of the California Medical Association.* 328 pages; illustrated. Lea & Febiger, Philadelphia, Pa., publishers, 1950. Price $6.

MANUAL OF RHEUMATIC DISEASES, by W. Paul Holbrook, M. D., and Donald F. Hill, M. D., *Tucson, Ariz.*, with the assistance of Charles A. L. Stephens, Jr., M. D. 182 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., publishers, 1950. Price $4.25.

SOME RELATIONS BETWEEN VISION AND AUDITION, by J. Donald Harris, Ph. D., *Head, Sound Section, U. S., Naval Medical Research Laboratory, New London, Conn.* Publication Number 71, American Lecture Series. 56 pages. Charles C Thomas, Publisher, Springfield, Ill., 1950. Price $1.50.

CLINICAL USES OF INTRAVENOUS PROCAINE, by David J. Graubard, M. D., *Assistant Visiting Surgeon, Cumberland Hospital; Assistant Visiting Orthopedist, Kingston Avenue Hospital, Brooklyn, N. Y.; formerly Assistant Surgeon, Reconstruction Hospital Unit, New York Post-Graduate Medical School and Hospital, N. Y.;* and Milton C. Peterson, M. D., *Visiting Anesthesiologist, Research Hospital, Kansas City, Mo.; formerly Anesthesiologist, New York Post-Graduate Medical School and Hospital; Associate Professor of Anesthesia, New York Post-Graduate Medical School, N. Y.* Publication Number 73, American Lecture Series. 104 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1950. Price $2.25.

THE MERCK MANUAL of Diagnosis and Therapy, a Source of Ready Reference for the Physician. 8th edition. 1592 pages. Merck & Co., Inc., Rahway, N. J., publishers, 1950. Price $5.

LIGHT THERAPY, by Richard Kovacs, M. D., *Professor of Physical Medicine, New York Polyclinic Medical School and Hospital.* Publication Number 57, American Lecture Series. 112 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1950. Price $2.25.

THE DIAGNOSIS OF SALMONELLA TYPES, by F. Kauffmann, M. D., *Chief, International Salmonella Center, State Serum Institute, Copenhagen, Denmark.* Publication Number 62, American Lecture Series. 86 pages. Charles C Thomas, Publisher, Springfield, Ill., 1950. Price $2.25.

MODERN PRACTICE IN DERMATOLOGY, edited by G. B. Mitchell-Heggs, O. B. E., M. D., F. R. C. P., *Physician-in-Charge, Skin Department, St. Mary's Hospital and Medical School, London; Physician, St. John's Hospital for Diseases of the Skin and Institute of Dermatology, University of London; Member Advisory Panel on Dermatitis, Ministry of Labour and National Service.* 836 pages; illustrated. Paul B. Hoeber, Inc., New York, N. Y., publisher, 1950. Price $12.50.

MEDICAL DIAGNOSIS, Applied Physical Diagnosis, edited by Roscoe L. Pullen, M. D., F. A. C. P., *Professor of Graduate Medicine, Director of the Division of Graduate Medicine, and Vice Dean of the School of Medicine, Tulane University of Louisiana; Senior Visiting Physician, Charity Hospital of Louisiana at New Orleans; Consultant in Medicine, Veterans' Administration Hospital, New Orleans, La.; Consultant to the Surgeon General, Department of the Army, Washington, D. C.* 2d edition. 1119 pages; illustrated with 601 figures, 48 in color. W. B. Saunders Co., Philadelphia, Pa., publishers, 1950. Price $12.50.

CLINICAL ELECTROCARDIOGRAPHY, by Francis F. Rosenbaum, M. D., *Assistant Clinical Professor of Medicine, Marquette University School of Medicine; Staff, Milwaukee County Hospital; Associate Staff, Columbia Hospital; Adjunct Staff, Milwaukee Children's Hospital; Cardiac Consultant and Attendant, Cardiac Clinic, Milwaukee Children's Hospital, Milwaukee, Wis.* Edited by Henry A. Christian, A. M., M. D., LL. D., Sc. D. (Hon.), M. A. C. P., Hon. F. R. C. P. (Can.), D. S. M. (A. M. A.), *Hersey Professor of the Theory and Practice of Physic, Emeritus, Harvard University; Sometime Clinical Professor of Medicine, Tufts College Medical School; Sometime Visiting Physician, Beth Israel Hospital; Sometime Physician-in-Chief, Carney Hospital; Physician-in-Chief, Emeritus, Peter Bent Brigham Hospital, Boston, Mass.* (Reprinted from Oxford Loose-Leaf Medicine with the same page numbers as in that work.) 205 pages; illustrated. Oxford University Press, New York, N. Y., publishers, 1950. Price $4.50.

MODERN TRENDS IN ORTHOPAEDICS, edited by Sir Harry Platt, M. C., M. S., F. R. C. S., *Professor of Orthopaedic Surgery, University of Manchester; Consultant Adviser in Orthopaedics to the Ministry of Health; President, Société Internationale de Chirurgie Orthopedique et de Tramatologie.* 497 pages; illustrated. Paul B. Hoeber, Inc., New York, N. Y., publisher, 1950. Price $35.

NUTRITION AND DIET THERAPY, by Fairfax T. Proudfit, *formerly Instructor in Nutrition and Diet Therapy, University of Tennessee College of Medicine and Tennessee School of Nursing; Director of Dietary Department, John Gaston Hospital, Memphis, Tenn.;* and Corinne Hogden Robinson, *Lecturer in Nutrition and Dietetics, Temple University School of Medicine, Philadelphia; formerly Instructor in Nutrition and Diet Therapy, Columbia University School of Nursing.* 10th edition. 950 pages; illustrated. The Macmillan Co., New York, N. Y., publishers, 1950. Price $4.

THE PHARMACOPEIA OF THE UNITED STATES OF AMERICA (The United States Pharmacopeia), Fourteenth Revision (U. S. P. XIV) and The First U. S. P. XIV SUPPLEMENT. By authority of the United States Pharmacopoeial Convention, Inc., meeting at Washington, D. C., May 14 and 15, 1940. Prepared by the Committee of Revision and Published by the Board of Trustees. Official from November 1, 1950. 1066 pages. Mack Publishing Company, Easton, Pa., publishers, 1950. Price $9.

MARRIAGE IS WHAT YOU MAKE IT, by Paul Popenoe, Sc. D., *General Director, The American Institute of Family Relations, Los Angeles, Calif.* 221 pages. The Macmillan Company, New York, N. Y., publishers, 1950. Price $3.

THE CEREBRAL CORTEX OF MAN, A Clinical Study of Localization of Function, by Wilder Penfield, C. M. G., M. D. (Johns Hopkins), B. Sc. and D. Sc. (Oxon.), Hon. F. R. C. S. (Lond.), F. R. S., *Professor of Neurology and Neurosurgery, McGill University; Director, Montreal Neurological Institute;* and Theodore Rasmussen, M. D., *Professor of Neurological Surgery, The University of Chicago; formerly, Lecturer in Neurosurgery, McGill University; Assistant Surgeon, Montreal Neurological Institute.* 248 pages; illustrated. The Macmillan Co., New York, N. Y., publishers, 1950. Price $6.50.

MANAGEMENT OF PERIPHERAL ARTERIAL DISEASES, by Saul S. Samuels, A. M., M. D., *Chief of the Department of Arterial Diseases, Stuyvesant Polyclinic Hospital, New York; Consulting Vascular Surgeon, Long Beach Hospital, Long Beach, N. Y.; Director and Attending Angiologist, Brooklyn Hebrew Home and Hospital for Aged, Brooklyn, N. Y.; Fellow in Surgery, New York Academy of Medicine; Member of Committee on Surgery, New York Diabetes Association; Editor-in-Chief, "Angiology"; President, Angiology Research Foundation.* 345 pages; illustrated. Revised and enlarged from The Diagnosis and Treatment of Diseases of the Peripheral Arteries. Oxford University Press, New York, N. Y., publishers, 1950. Price $7.50.

MEDICAL PARASITOLOGY, for Medical Students and Practicing Physicians, by William G. Sawitz, M. D., *Associate Professor of Parasitology, Associate in Medicine, The Jefferson Medical College of Philadelphia; Special Consultant, U. S. Public Health Service, Communicable Disease Center, Atlanta, Ga.* 296 pages; illustrated. The Blakiston Co., Philadelphia, Pa., publishers, 1950. Price $4.25.

ORAL AND FACIAL CANCER, *by Bernard G. Sarnat,* M. D., F. A. C. S., *Professor and Head of the Department of Oral and Maxillofacial Surgery, College of Dentistry, and Clinical Assistant Professor of Surgery, College of Medicine and Research and Educational Hospital, University of Illinois, Chicago; Diplomate of the American Board of Plastic Surgery;* and Isaac Schour, D. D. S., Ph. D., Sc. D., *Coordinator of Cancer Instruction, Professor and Head of the Department of Histology and Associate Dean in Charge of Postgraduate Studies, University of Illinois College of Dentistry, Chicago,* with a foreword by Andrew C. Ivy, Ph. D., M. D., D. Sc., *Vice President in Charge of Chicago Professional Colleges, University of Illinois; Executive Director of The National Advisory Cancer Council.* 300 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., publishers, 1950. Price $6.

LIPPINCOTT'S QUICK REFERENCE BOOK FOR NURSES, by Helen Young, R. N., *Director of Nursing, Emeritus, Columbia Presbyterian Medical Center, Editorial Board, Department of Nursing, Faculty of Medicine, Columbia University, Presbyterian Hospital School of Nursing, New York;* Mary Elizabeth Allanach, A. M., R. N., *Assistant Professor of Nursing;* Elizabeth S. Gill, B. S., R. N., *Instructor in Nursing;* Eleanor Lee, A. B., R. N., *Assistant Professor of Nursing;* G. Harriet Mantel, A. M., R. N., *Instructor in Nursing;* Helen F. Pettit, B. S., R. N., *Assistant Professor of Nursing.* 6th edition. 626 pages. J. B. Lippincott Co., Philadelphia, Pa., publishers, 1950. Price $3.

WORLD SURGERY, 1950, by Stephen A. Zieman, M. A., M. D., F. A. C. S., F. I. C. S., *Abstract and News Editor, Journal of the International College of Surgeons, Abstractor for International Abstracts of Surgery and Surgery, Gynecology and Obstetrics, formerly Assistant Chief, Division of Publications, Bureau of Medicine and Surgery, U. S. Navy, and Assistant Editor, U. S. Naval Medical Bulletin.* 177 pages; 53 illustrations. J. B. Lippincott Co., Philadelphia, Pa., publishers, 1950. Price $6.

BOOK REVIEWS

SIMMONDS' DISEASE, Extreme Insufficiency of the Adenohypophysis, by R. F. Farquharson, M. B., F. R. C. P. (C), *Professor of Medicine and Head of the Department, University of Toronto; Physician-in-Chief, Toronto General Hospital, Toronto, Canada.* Publication Number 34, American Lecture Series. 93 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1950. Price $2.

The book is one of the American Lecture Series and is an excellent presentation of the pathology, pathogenesis, clinical picture, and diagnosis of Simmonds' disease. The presence of the syndrome is discussed as occurring only when there is destruction of the pituitary gland. The destructive lesion is caused by one of the following conditions: ischemic necrosis, fibrosis, tumor, or granuloma. Each of these is well described. The lack of mention of ACTH, one of the recent greatest medical discoveries, as applied to the treatment and physiology of the pituitary gland, is a serious omission. Although the relation of the pituitary gland to the other endocrine glands is discussed, the more recent physiologic knowledge of this relationship is omitted. There are many references throughout the text and an excellent bibliography at the end. The book would be read with profit by the general medical man, the obstetrician, and with interest by the endocrinologist. It is a comprehensive study of the syndrome.—*Commander H. A. Lyons (MC) U. S. N.*

TEXTBOOK OF BACTERIOLOGY, by Joseph M. Dougherty, A. B., M. A., Ph. D., *Dean of the School of Science and Professor of Bacteriology, Villanova College; Fellow of the American Association for the Advancement of Science,* and Anthony J. Lamberti, B. S., M. S., *Instructor in Bacteriology and Parasitology, Temple University School of Medicine; formerly Instructor in Bacteriology, Villanova College; Member of the American Public Health Association.* 2d edition. 491 pages; illustrated. C. V. Mosby Co., St. Louis, Mo., publisher, 1950. Price $5.75.

The authors believe that many of the available textbooks of bacteriology are too extensive for undergraduates. Although the need for less comprehensive coverage is admitted, a brief account, if it is to be adequate, requires wisdom and mastery in selection and presentation, perhaps to a greater degree than is necessary for more complete texts. This book contains an abbreviated survey of all aspects of medical microbiology, but these are too superficially treated, and some sections are antiquated. Examples are found in the discussion of the relation of "precipitins" to "agglutinins," and of the value of serum therapy in meningococcic infections. An excellent opportunity to demonstrate the principles and use of antigenic analysis is neglected in the section on *Salmonella.* Reference to antigenic differences in the *Shigella* group is omitted entirely. For the purpose intended, the reviewer believes that thorough study of illustrative parts of a good textbook, under able direction, would supply a sturdier foundation than the use of an almost equally expensive but superficial survey, such as the text under consideration.—*Lt. Col. L. R. Kuhn, MSC, U. S. A.*

CURRENT THERAPY 1950, Latest Approved Methods of Treatment for the Practicing Physician. Edited by Howard F. Conn, M. D. Consulting Editors: M. Edward Davis, Vincent J. Derbes, Garfield G. Duncan, Hugh J. Jewett, William J. Kerr, Perrin H. Long, H. Houston Merritt, Paul A. O'Leary, Walter L. Palmer, Hobart A. Rei-

mann, Cyrus C. Sturgis, Robert H. Williams. 736 pages. W. B. Saunders Co., Philadelphia, Pa., publishers, 1950. Price $10.

This book is an excellent treatise on modern current therapy from the pens of practicing physicians who tell in a clear, concise manner the procedures they recommend for the treatment of various diseases which are based on the results obtained from their own private practice. The obsolete methods contained in the 1949 volume have been deleted; valuable information in the 1949 edition has been repeated, and all the new and practical treatments have been added. The contents of the book have been divided into 15 sections which cover the diseases in the following categories: (*a*) infections; (*b*) respiratory system; (*c*) cardiovascular system; (*d*) blood and spleen; (*e*) digestive system; (*f*) metabolism and nutrition; (*g*) endocrine system; (*h*) urogenital tract; (*i*) venereal diseases; (*j*) skin; (*k*) allergy; (*l*) nervous system; (*m*) locomotion; (*n*) obstetric and gynecologic conditions; and (*o*) physical and chemical agents.

The changes in the treatment of the various diseases by chemotherapeutic advances may be illustrated by referring to the chapter on the modern prevention and treatment of malaria where new drugs have almost entirely replaced the old stand-by, quinine. To those who wish to criticize or take issue with certain recommendations made by the authors as to the best therapy available for the treatment of certain diseases there is room for argument; for example, the use of electro-shock therapy in manic depression and schizophrenia. The book is well written, well bound, and printed in an easy-to-read bold type on paper of excellent quality. The index is complete—which often saves valuable time when quick reference is necessary. It is highly recommended to the student and practicing physician, both of whom are interested in keeping current with the best in practical therapy.—*Capt. C. R. Ball (MC) U. S. N.*

OFFICE ORTHOPEDICS, by Lewis Cozen, M. D., F. A. C. S., *Attending Orthopedic Staff: The Orthopedic Hospital, Veterans' Hospital, Los Angeles County Hospital, Cedars of Lebanon Hospital, Los Angeles, and Los Angeles Tuberculosis Sanitarium, Monrovia, Calif.; Assistant Professor of Orthopedic Surgery, College of Medical Evangelists, Los Angeles.* 232 pages; 156 illustrations. Lea & Febiger, Philadelphia, Pa., publishers, 1950. Price $5.

This little book fills a gap which exists in the orthopedic information available to the student and general practitioner. It furnishes practical information on orthopedic subjects that will come as an invaluable aid to those who are called on to treat minor orthopedic conditions and to recognize major orthopedic lesions in general practice, especially in outlying communities. Many of these minor conditions are all too briefly dismissed in standard orthopedic texts.

The outstanding quality of the book is the detail given to the procedures that can easily be carried out in the office, such as the treatment of minor fractures and foot complaints. Materials, specifications for simple apparatus, and directions for their use are carefully described. The section dealing with symptom diagnosis is especially useful. The author is careful to state in his preface that "at least one complete standard work on orthopedic surgery should be available to the physician who uses this volume." When discussing the types of lesion that are suitable for treatment in office practice he usually states specific limitations and the reader is warned, at least by inference, of those which are not. The impression is also given, fortunately, that many of the conditions are beyond the scope of the general practitioner.

The work covers briefly, and often by mere mention, so many diverse orthopedic and related conditions that it suffers from oversimplification. It is also questionable whether the treatment (not the recognition) of clubfoot should come in the realm of the general practitioner. Certainly the technique of

cervical and lumbar sympathetic block should not be encouraged as office practice for the uninitiated. In spite of the fact that the author has felt compelled to run the gamut of orthopedic diagnoses from arthrokatadysis to Waldenström's disease, the material is well presented and the precautions clearly stated. The book is recommended as a useful reference for the general practitioner who must carry out some orthopedic office procedures.—*Col. E. A. Brav, MC, U. S. A.*

THE PATHOLOGY OF ARTICULAR AND SPINAL DISEASES, by Douglas H. Collins, O. B. E., M. D., (Liverp.); *Reader in Clinical Pathology in the University of Leeds; formerly: Rheumatism Research Fellow in the University of Leeds; E. M. S. Pathologist and Medical Superintendent, Wharncliffe Hospital, Sheffield; Junior Lecturer and Holt Fellow in Pathology in the University of Liverpool.* 331 pages; illustrated. The Williams & Wilkins Co., Baltimore, Md., publishers, 1950. Price $7.

This textbook provides an up-to-date and well-illustrated account of the morbid anatomy of the joints and spine. The introductory chapters deal primarily with the anatomy and physiology of the joint tissues and bone. The following 15 chapters discuss the diseases of joints and the spine in a conventional pathologic sequence. An attempt is made to relate and compare the various diseases and orient them within the framework of general pathology. The illustrations, which are all original, are exceptionally good. They have been prepared from post-mortem material with only an occasional radiograph to demonstrate certain unusual features. To quote the author: "Few practitioners have had the opportunity of studying these diseases in the post-mortem room or in the histological laboratory and much of their knowledge of the pathological processes involved is founded on radiology which is only the shadow without the substance of morbid anatomy."

Tumors of bone receive only brief mention—which seems regrettable in a text of this nature. Disorders of bone other than those directly affecting joints are reviewed in chapter 3 in summary form. The book should appeal not only to the pathologists but to orthopedists and radiologists as well.—*Commander K. P. Knudtson (MC) U. S. N.*

COMMUNICABLE DISEASES, edited by Roscoe L. Pullen, A. B., M. D., F. A. C. P., *Professor of Graduate Medicine, Director of the Division of Graduate Medicine, and Vice-Dean of the School of Medicine, Tulane University of Louisiana; Senior Visiting Physician, Charity Hospital of Louisiana at New Orleans; Consultant in Medicine, Veterans' Administration Hospital, New Orleans, La.; Consultant to the Surgeon General, Department of the Army, Washington, D. C.* 1,035 pages; illustrated. Lea & Febiger, Philadelphia, Pa., publisher, 1950. Price $20.

This new book is a compilation of articles written by 53 contributors most of whom are or have been associated with Charity Hospital of Louisiana at New Orleans. As such, it reflects largely the experience and practice in communicable disease management at that institution. Although of value as a textbook, this work was produced chiefly to aid the clinician in recognizing and managing communicable illnesses, particularly in the earliest stages. For this reason the arrangement of contents is unconventional in that the communicable diseases are grouped according to predominant manifestations. Although subject to pedagogic criticism, this manner of organization increases the value of the book as a clinical reference. This quality is further enhanced by the inclusion of numerous tables pertaining to diagnostic criteria and treatment which may be easily and rapidly consulted by the busy clinician. On the other hand, each topic is presented in traditional textbook form for ease in reading. The illustrations are adequate and the reproductions are excellent. In general the subjects are well covered and include references to some of the most recent literature. Some exceptions are remarkable, however. For instance, the roles of DDT, benzyl

benzoate, and undecylenic acid in treating pediculosis, scabies, and dermatophytosis, respectively, are de-emphasized in favor of the older types of treatment. This seems unjustifiable in view of the military medical experience with these compounds. Similarly the article on rheumatic fever fails to mention the use of penicillin as a prophylactic by persons who have had the disease. Under epidemic diarrhea of the newborn the replacement of fluids and electrolytes is not sufficiently stressed or described in adequate detail. Aside from these deficiencies, the text is reasonably up to date, particularly with regard to the field of antibiotic therapy. The book is recommended for reference use in all military hospitals and large dispensaries.—*Maj. C. M. Eberhart, MC, U. S. A.*

ADVANCES IN INTERNAL MEDICINE, Volume 3. Edited by William Dock, M. D., *Long Island College of Medicine, Brooklyn, N. Y.*, and I. Snapper, M. D., *The Mount Sinai Hospital, New York, N. Y.* 478 pages; illustrated. Interscience Publishers, Inc., New York, N. Y., publishers, 1949. Price $8.50.

This third volume in a series devoted to advances in internal medicine is intended to present current information and concepts of importance within that field. Such a book, as the editors were well aware, becomes dated almost as soon as it is off the press. However, such an objection is ameliorated by the quality of the presentation. It will undoubtedly remain an informative volume until the next edition is ready for release. The presentation is not as an abstract or digest of current literature, but rather a series of articles on subjects of current interest. There is no attempt at continuity of subject presentation. This volume reviews the use of British anti-lewisite, the hemolytic anemias, factors modifying the therapeutic activity of penicillin, streptomycin, histoplasmosis, antithyroid compounds, diagnosis by enzymic methods, plasma fractionation, heat acclimatization, and new therapeutic agents in neurologic conditions.

The list of contributors is impressive; their contributions equally so. The subjects are covered concisely and completely. There is no "rehash" of old or readily available material. Complete bibliographies are appended. An objection might be made to the lack of organization in regard to subject presentation, but this is a minor consideration. The book is cloth bound, the printing and illustrations are of good quality. This volume is most highly recommended, especially for the physician too busy or too far separated from medical library facilities to avail himself of current medical literature.—*Lieutenant Commander A. R. Errion (MC) U. S. N.*

QUINIDINE IN DISORDERS OF THE HEART, by Harry Gold, M. D., *Professor of Clinical Pharmacology at Cornell University Medical College; Attending-in-Charge of the Cardiovascular Research Unit at the Beth Israel Hospital; Attending Cardiologist at the Hospital for Joint Diseases; Managing Editor of the Cornell Conferences on Therapy.* 115 pages. Paul B. Hoeber, Inc., New York, N. Y., publisher, 1950. Price $2.

This small monograph provides the clinician with practically all he needs to know concerning the use of quinidine in the treatment and prevention of disorders of the heart beat. Dr. Gold has drawn on his wide clinical and experimental knowledge to write a practical manual that will prove invaluable to the internist and the general practitioner alike. The indications, thereapeutic actions, toxic actions, absorption, and elimination of quinidine are adequately described. There is a detailed plan for an effective yet safe doseage schedule. A regimen for intravenous administration, particularly in the control of ventricular tachycardia, is presented at great length. The use of quinidine in each of the ectopic rhythms is described. Whenever the author believes that digitalis is the drug of choice in treating an arrhythmia, he so states. In an excellent chapter on the combined used of quinidine and digitalis he discusses this controversial subject

from all viewpoints and gives his conclusions based on his own experience. Blood levels produced by various dosage schedules, the rate of their cumulation, and the correlation between the level attained and the therapeutic effect are discussed too briefly, but this is a minor criticism. An excellent bibliography is arranged chronologically at the end of the book. This small work serves a useful purpose and should be in the libraries of all hospitals and clinicians who treat cardiac arrhythmias.—*Col. E. M. Goyette, MC, U. S. A.*

A PRIMER FOR DIABETIC PATIENTS, by Russell M. Wilder, M. D., Ph. D., F. A. C. P., *Professor and Chief of the Department of Medicine of the Mayo Foundation, University of Minnesota; Senior Consultant in the Division of Medicine, Mayo Clinic.* 9th edition. 200 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., publishers, 1950. Price $2.25.

Doctor Wilder has given in this compact and simple manual all the essentials needed by the diabetic patient. Its size is such that it can be conveniently carried in a coat pocket or purse. This is the ninth edition since 1921. It reflects the teachings of the diabetic school conducted for patients at the Mayo Clinic. The primer is extremely practical from start to finish. The questions at the end of most chapters are helpful for the student-patient. Each question includes a reference to the page of the text containing the answer. The physician will also find it helpful in understanding the patient's viewpoint and will find the section on diet and foods useful if he does not have the services of a trained dietitian.—*Col. R. P. Johnson, MC, U. S. A.*

BACTERIAL INFECTION With Special Reference to Dental Practice, by J. L. T. Appleton, B. S., D. D. S., Sc. D., *Professor of Bacteriopathology and Dean, The Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania.* 4th edition, thoroughly revised. 644 pages; illustrated. Lea & Febiger, Philadelphia, Pa., publishers, 1950. Price $10.

This is the fourth edition of a well-known textbook on bacterial infection with special reference to dental practice by a recognized authority. It has been thoroughly revised and brought up to date by the inclusion of new knowledge derived through research, with emphasis placed on a clinical application of the results of such investigations. Part I presents an account of the general knowledge of the morphology, physiology, and ecology of bacteria. Part II deals with infection as an entity, and Part III presents an analysis and a summary of what is known about the common infections associated with the oral cavity. The 40 chapters which constitute the text each contains a comprehensive bibliography which effectually covers the material discussed. This book should be in the library of every dentist as a ready reference to problems which may be encountered by him in daily practice. It is also highly recommended to all others interested in bacterial infection.—*Commander G. L. Parke (DC) U. S. N.*

HORMONES IN CLINICAL PRACTICE, by H. E. Nieburgs, M. D., *Research Associate, Department of Endocrinology, and Assistant Professor, Department of Oncology, University of Georgia; Lately Research Endocrinologist, Department of Obstetrics and Gynaecology, British Post-Graduate Medical School, and Clinical Assistant, Endocrine Clinic, Westminster Hospital, London.* 386 pages; illustrated. Paul B. Hoeber, Inc., New York, N. Y., publisher, 1950. Price $5.50.

The author has divided his book into two distinct parts. The first three-fifths discusses the anatomy, physiology, and the interrelation of each endocrine gland with other glands and with the body physiology. This is followed by indications for treatment and commercial preparations used with their dosage for each gland together with vitamin relationships. The discussions of the physiology of the various glands and their interrelationship is brief and didactic. This simplification might lead those not cognizant to the side effects of certain glandular prep-

arations to use them empirically. The remainder of the book describes the laboratory and clinical tests available to the physician. This portion can be considered a manual for a complete endocrine laboratory. Although this discussion acquaints the physician with the tests available, many of them are beyond his scope or even that of the average hospital laboratory. The others are useful in practical clinical work and are adequately discussed. The bibliography is excellent. This book is definitely a reference work and as such can be recommended to libraries and those wishing a thumbnail sketch of the physiology and therapeutics of endocrine dyscrasias.—*Commander R. E. Crowder (MC) U. S. N.*

CLINICAL NUTRITION, edited by Norman Jolliffe, M. D., F. F. Tisdall, M. D., and Paul R. Cannon, M. D., for the Food and Nutrition Board of the National Research Council. 925 pages; illustrated. Paul B. Hoeber, Inc., New York, N. Y., publisher, 1950. Price $12.

This outstanding book, published under the auspices of the Food and Nutrition Board of the National Research Council, is the most comprehensive volume dealing with nutrition that has been published to date. In spite of its modest title it contains discussions on such topics as the role of nutrition in preventive medicine, public health, and industrial hygiene in additon to clinical nutrition.

Of the three parts into which the book is divided, Part I, dealing with the diagnosis of nutritional deficiency, is of most importance to the physician in the recognition of deficiency symptoms. Detailed descriptions are given not only of the easily recognized signs of advanced florid deficiency, but also of early signs of deficiency which are often vague, nonspecific, and which are many times overlooked or neglected by the physician. The authors skillfully combine two schools of thought, one of which sees nutritional significance in every clinical manifestation and the other which insists that they may be caused by other factors. The illustrations are the outstanding feature of Part I; over 60 are reproductions in color selected from the best illustrations available on the physical diagnosis of nutritional deficiency by surface diagnostic methods. These colored plates give visual definition to such commonly used terms as scarlet red or beefy red glossitis and magenta tongue.

The differentiation between primary and secondary or conditioned nutritional inadequacy is discussed. Failure to recognize this differentiation will lead to errors in diagnosis and treatment because of lack of appreciation of cause and effect. In the chapters on biochemical methods and laboratory aids, the means, necessity, and value of confirming by laboratory tests the presumptive diagnosis based on clinical examination are discussed. The literature on normal and abnormal levels of various nutrients in body fluids and excretions is reviewed and limits defined. No specific directions for making the determinations are given and no specific methods are recommended. The reader is left with the impression that the results of laboratory tests are of more value when applied to population groups than when applied to individuals.

In Part II the individual nutrient elements are discussed in conventional textbook style. There is some repetition of material presented in Part I but the material is presented from a different viewpoint. The value of this part lies in the fact that the recent literature dealing with each nutrient is extensively reviewed by an authority in the field.

In Part III the authors discuss the therapy and prevention of deficiency states in general. It is pointed out that deficiency states involve multiple factors, and that nutritional therapy does not consist of giving only the nutrient of which a deficiency is clinically manifest but in giving, in addition, the best and most adequate diet possible. This section of the book deals therefore, mainly with

general principles of dietotherapy. The importance of nutrition in preventive medicine is brought out in chapters on nutrition in public health practice and in industrial medicine. Under this latter heading the authors discuss the nutrient requirements in relation to physical efficiency under various forms of stress.

The appendix contains tables useful for formulating therapeutic diets and in making nutritional evaluations of dietaries. This book is of great interest not only to clinicians but to workers in the field of nutrition and public health.—*Maj. C. J. Koehn, MSC, U. S. A.*

NUTRITION AND DIET THERAPY, by Fairfax T. Proudfit, *formerly Instructor in Nutrition and Diet Therapy, University of Tennessee College of Medicine and Tennessee School of Nursing; Director of Dietary Department, John Gaston Hospital, Memphis, Tennessee;* and Corinne Hogden Robinson, *Lecturer in Nutrition and Dietetics, Temple University School of Medicine, Philadelphia; formerly Instructor in Nutrition and Diet Therapy, Columbia University School of Nursing.* 10th edition. 950 pages; illustrated. The Macmillan Co., New York, N. Y., publishers, 1950. Price $4.

This text, basically for the teaching of student nurses, is also a valuable reference book for anyone interested in diet in health and disease. Separate sections cover normal nutrition; nutrition in such conditions as pregnancy, lactation, and childhood; diet in disease; and elementary cookery. Of special value to those working with diets are the complete tables of food values that are found in the appendix. Summary tables of all food elements as well as of digestive processes are included in the text. A separate chapter on diagnostic tests involving diets is a welcome addition not found in most texts of this type. The chapters on diet therapy include the physiologic or pathologic factors underlying the type of diet used. Foods are classified as those to be used and those to be avoided, also in handy tabular form. A basic diet and sample menu is provided for each special diet. The section on fundamental cookery should be extremely useful for those preparing special diets in the home.—*Lt. H. M. E. Linnenbruegge (NC) U. S. N.*

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